THE
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ELECTRO-PLATERS REVIEW

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Electro-Platers' Convention in Newark

Advance Information About the Fourteenth Annual Convention in Newark, N. J., June 28-July 1, 1926

Written for The Metal Industry by E. A. SHAY, Newark, N. J.

HISTORY OF NEWARK

From a country hamlet located under the shadow of the world's second largest city, Newark has grown almost overnight into a great city in its own right, with a great phalanx of industries making everything almost needed by man or woman.

NEW BRONZE MEMORIAL, "WARS OF AMERICA," UNVEILED IN NEWARK, N. J., MAY 31, 1926.

Two hundred and sixty years ago, May 17, 1666, sixty-five men and their families from the colonies of Connecticut headed by Robert Treat, sailed up the Passaic river and landed at what is now the foot of Center street. They brought with them a supply of food, meager in quantity, and a supply of firearms, powder, bullets, clothing, beer and rum which was used for the purchase of the land from the Indians.

A stockade, in which was a little group of log cabins, made up the first settlement. The little group of colonists, practically all of English descent, attracted others and a long, straggling street stretched its way into the wilderness from the shores of the river. The town pump, at the corner of Broad and Market streets, the principal thoroughfares, sometimes called the second busiest corner of the United States today, was the center of the gatherings of the day.

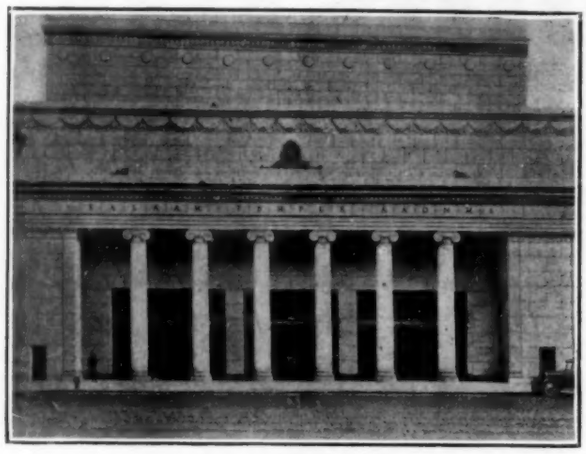
In the 1700's, the banks of the Passaic became the sites of the homes of New York's aristocracy and great estates stretched along both banks for miles to the north of where Treat had landed. Here were held the stately affairs of the people of wealth of the time, and here were entertained the titled visitors from foreign shores. Washington, Lafayette, Hamilton, Burr, Decauter, Boudinot and others spent many pleasant hours in the homes since replaced by industrial plants, marts of commerce and great office buildings. One of the few remaining of the old homes, now occupied by the Essex Club, is about to give way to an addition for Newark's largest hotel, the Robert Treat.

By 1915, the population had grown to 366,728 while today it is estimated in the neighborhood of 460,000. Add to it the population of more than half score neighboring municipalities whose border lines cannot be distinguished by the eye of the passerby, being simply a passage from one street to another, and Newark will have a population of approximately 1,000,000. Within a radius of twelve miles of the city, the Newark Chamber of Commerce has estimated, there live approximately 7,500,000 persons while a radius of fifty miles includes a population of more than 10,000,000.

Newarkers are proud of their municipal and county park system, embracing more than a dozen parks ranging from an acre to more than 3,000, acres in extent. In the center of the city is Military, Washington and Lincoln Parks, in the former of which troops have trained or encamped for all the early wars of the nation. In each are historic pieces of statuary. On May 31, "The Wars of Democracy," the sculptor of which was Gutzon Borglum, was unveiled in Military Park.

This piece of statuary, the gift of the late Amos Van Horn, is the largest piece of bronze in the country. It was cast in Italy in five sections and brought to this coun-

try where it was joined together. The model was made by Mr. Borglum at his Connecticut studio and sent to Italy where a wax model was made. This was covered with clay and baked, the wax disappearing in the baking process. The molten bronze was then poured into the

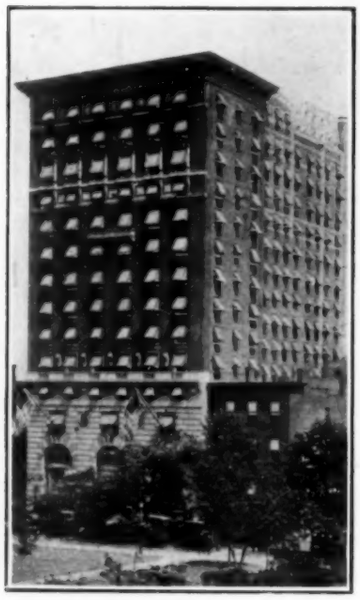


SALAAM TEMPLE

baked clay mold. After being cast, the natural process in coloring the bronze was hastened by use of acids, what nature would take a year to do being done in a few minutes.

PLATING SHOPS IN NEWARK

Newark is not the electro-plating center that marks sections of the New England states, particularly Connecticut, and the Middle West. There are, however, a number of nationally known firms that have well-equipped electro-plating departments and a few commerical concerns. Included in the former are those of Tiffany & Company, August Goertz & Company, Art Metal Works, Krauter & Company, and the Singer Sewing Machine Company.



ROBERT TREAT HOTEL.

Other electro platers in the city include Acme Plating Works, Baxter Hugh Plating Works, B. Conlon & Company, Eagle Nickel Plating Company, Electro-Metallic Products Company, Four Plating Company, Hodecker Brothers, Hy-Grade Electro-Plating Company, Charles R. Kristen, August Landoskey, Newark Nickel Plating Company, E. Newton & Co., Pasquale Paralli, United Spinning, Polishing & Nickel Plating Company, West Side Plating Company and William F. Yeager.

CONVENTION PLANS

Plans for the fourteenth annual convention of the American Electro-Platers' Society, which will begin on Monday, June 28 and continue until July 1, are very complete. These have been made under the personal direction of Horace H. Smith of 208 North Third street, Newark, a former officer of the national body, assisted by a score of members of the Newark Branch. Included in the group are F. W. Matts, Oliver Sizelove, George Hogaboom, A. P. Munning 2nd., Samuel Taylor, Philip Sievering, George Reuter, William DeVoti, Frank Dressel, Peter Labash, S. Glickenhaus, Charles Bohler, Charles Knopf, R. F. Clark, George Conley, A. C. Calabrese, Fred Gumm, Harry McGovern, Conrad Frey, J. A. Weiss, Charles Piske, W. L. Hults, Roy Stout, George Onksen, Henry Berfels, Edward Faint, C. H. Kopp, T. T. Dondi and G Wagner.

CHARLES H. PROCTOR
Founder, American Electro-Platers' Society.

The sessions will be held in the auditorium of the Mosque Theater, at Broad and Camp streets. Here also will be the headquarters of the convention committee, the registration office and the exhibit. The latter will show the products of some twenty-five firms allied with the electro-plating business, several thousand feet of space being used. It is anticipated that there will be more than 500 delegates from all over the country and Canada and that the attendance at each session will average approximately 1,000 people.

ELKS' CLUB.

Rates at the various hotels which have agreed to cooperate with the convention committee are as follows.

Elks' Club: 50 single rooms, men only; special rate on application.

Robert Treat Hotel: single rooms $4, double rooms $8.

Hotel Reviera: single room $3, double rooms, $6.

St. Francis Hotel: 200 rooms, baths and showers; restaurant. Rates on application.

Headquarters until Sunday, June 27 will be with Horace H. Smith, at 208 North Third Street. After that they will be at the Salaam Temple.

BASEBALL GAME

The annual baseball game will be played as usual. The Eastern team will be captained by T. A. Trumbour, New York; West, by R. J. Hazucha, Chicago.

Program of Convention

Monday, June 28, 1926

MORNING SESSION

8:00—Registration and renewing of acquaintance.
9:00—Meeting of Executive Board in Secretary's quarters.
10:00—Meeting of Credential Committee.
10:30—Visit to Edison Lamp Works, Harrison, N. J.

AFTERNOON SESSION

2:00—Convention called to order by Chairman of Committee, Horace H. Smith. Address by President, Newark Branch, George Onkson.
Address of Welcome by Commissioner John F. Murray, Jr., representing City of Newark.
Response by Past Supreme President, Frank J. Hanlon.
Address by Charles H. Proctor, Founder of A. E. S.
Annual address by Supreme President, E. J. Musick.
Convention open for business.
Minutes of last regular meeting, report of officers, appointing of committees by Supreme President, presentation and reading of all resolutions.

EVENING SESSION

8:00—Meeting called to order by Robert Beebe, Director Essex County Vocational Schools.
Robert O. Beebe, Director Essex Vocational Schools. "Chemical Training in a Public School."
E. S. Shehperd, Ph. D., Assistant Director of Research, Eastman Kodak Company, Rochester, New York. "Electro-plating Rubber and Rubber Compounds" (Illustrated).
Stanislaus Skowronski, Ph. D., Chief, Research Department, Raritan Copper Company, Perth Amboy, N. J. "The Refining of Precious Metals" (Illustrated).

Tuesday, June 29, 1926

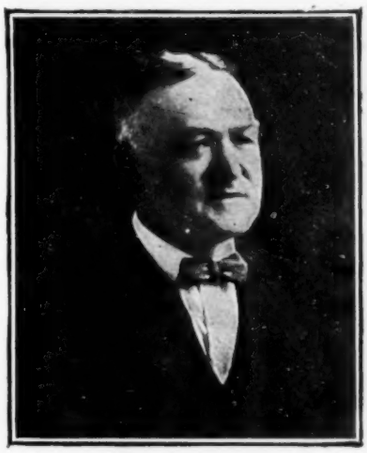
MORNING SESSION

8:30—William Blum, Ph. D., President, American Electro-Chemical Society; Chemist, U. S. Bureau of Standards. "Report of Progress of Electro Deposition at the Bureau of Standards."
Jacob Hay, Chicago Branch. "Preparing Surfaces for Japanning and Finishing."
C. H. Humphries, Director of Research, Metals Protection Company. "Cadmium Plating."
Walter Fraine, Superintendent of Electroplating, National Cash Register Company. "Tin Plating."
W. A. Taylor, Ph. D., Chemical Director, LaMotte Chemi-Concentration—pH."
W. E. Hughes, B. A. (Camb.) D. I. C. (London). Author, "Modern Electro-Plating." "Faraday's Laws."
R. L. Shepherd and B. F. Lewis, C. B. Shepherd Company, Detroit, Mich. "The Use of Permanganate in Nickel Solution."

Officers of the American Electro-Platers' Society

E. J. MUSICK,
President.

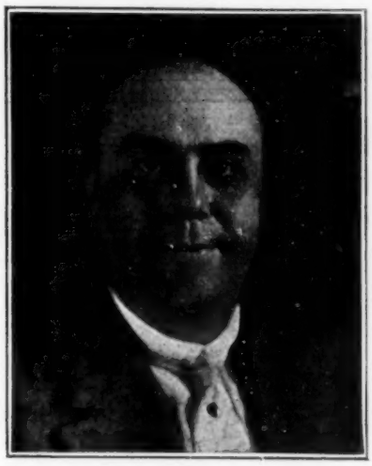
GEORGE GEHLING,
1st Vice President.



JOHN H. FEELEY,
2nd Vice President.

ROBERT STEUERNAGEL,
Secretary-Treasurer.

F. C. MESLE,
Editor, The Monthly Review.



F. J. HANLON,
Past President.

E. W. T. Faint, Mack Plant, International Motors Corporation, Allentown, Pa. "Plating of Automobile Parts for Service."
Adolph Bregman, Managing Editor THE METAL INDUSTRY. "The Value of a Trade Paper."
M. R. Thompson, Chemist U. S. Bureau of Standards. "A Study of Acid Zinc Solutions."

AFTERNOON SESSION

1:30—Colin G. Fink, Ph. D., Secretary, American Electrochemical Society; Professor, Electrochemistry, Columbia University. "Addition Agents in Electroplating Baths."
Robert W. Mitchell, Massachusetts Institute of Technology. "Practical Application of Modern Chemical Theory to Metal Cleaning."
E. K. Strachan, Ph. D., Professor, Physical Chemistry, Brown University. "Simple Methods of Chemical Control of Electroplating Operations; a Course of Study Given in Extension Department of Brown University."
Edwin M. Baker, B. S., Assistant Professor Chemical Engineering, University of Michigan. "Influence of Impurities upon Nickel Deposition."
3:00—Adjournment to vist plant of Hanson & Van Winkle Company.

EVENING SESSION

8:00—Charles H. Proctor, Electro-Plating Expert, Roessler & Hasslacher Chemical Company, Founder American Electro-Platers Society; Plating Chemical Editor, THE METAL INDUSTRY. "The Electro Deposition of Tin."
E. W. Heil, St. Louis Branch. "Current Measuring Instruments and Current Regulations."
J. DeGrazio, Chicago Branch. "Ironing Out a Few Wrinkles."
William J. R. Kennedy, Superintendent Electro-Plating, Westinghouse Electric & Manufacturing Company, Springfield, Mass. "Cadmium Plating."
William M. Phillips, General Motors Company, Detroit, Mich. "Specifications."
A. K. Graham, Instructor, Electrochemistry University of Pennsylvania. "Spotting Out."
Anthony Knechtel and Elias Schoor, N. Y. Branch. "Deposition and Grinding on Roto-Gravure Printing Cylinders."

Wednesday, June 30, 1926

8:00 A. M.—Trip to Raritan Copper Works, Raritan, N. J., and A. P. Munning & Company, Matawan, N. J.

EVENING SESSION

8:00—G. F. Stanton, Baltimore Copper Smelting and Rolling Company. "Copper—From Mine to the Finished Product" (Illustrated).
Robert Suman, Dayton Branch. "Observations on Electrotyping."
T. R. Porter, Edison Appliance Company, Chicago, Ill. "Choosing Buffing Compositions."
Winfred Scott, Frankford Arsenal, Philadelphia, Pa. "Zinc Plating."
J. Underwood, Philadelphia Branch, A. E. S. "Job Plating in a Manufacturing Plant."
Frank Hovath, St. Louis Branch, A. E. S. "Plating Generators."

Thursday, July 1, 1926

MORNING SESSION

Business session. Reports of Committees, election of officers, selection of convention city for 1927, adjournment.

AFTERNOON SESSION

Will go to Weequahic Park, where there will be boating, tennis, golf, races, baseball game and taking of the official pictures.

EVENING SESSION

Banquet, installation of officers, awarding of prizes for papers and exhibits, dinner, entertainment and dancing.

EXHIBITORS

The following firms have so far signified their intent to exhibit their products: Hanson & Van Winkle Company, Newark, N. J.; A. P. Munning and Company, New York; Maas and Waldstein Company, New York; Egyptian Lacquer Company, New York; MacDermid Company, Waterbury, Conn.; Connecticut Dynamo & Motor Company, Irvington, N. J.; Pittsburgh Plate Glass Company, Pittsburgh, Pa.; J. B. Ford Company, Wyandotte, Mich.; Matchless Metal Polish Company, Glen Ridge, N. J.; Zapon Company, New York; Raritan Copper Works, Perth Amboy, N. J.; Magnus Chemcial Company, Brooklyn, New York; Oakley Chemical Company, New York; Miner Edgar Company, New York; Daniels & Orben Company, New York.

In shipping exhibits, firms should be sure to address them **care of the American Electro-Platers' Society, so that they will not go astray.**

Program for the Ladies

In addition to the regular program for the delegates, the Women's Auxiliary of the Newark Branch have prepared a lengthy program for the entertainment of the wives and other relatives who accompany the delegates.

Their program will include card parties, a visit to the Edison plant making household appliances, automobile trips, bathing, dancing, luncheons, and shopping trips. They will watch the annual baseball game and, of course, attend the annual banquet and dance.

The chairman of the committee is Mrs. Horace N. Smith, Mrs. Charles Bohler being secretary and Mrs. F. W. Matts, treasurer. The other members include: Mrs. Oliver Sizelove, Mrs. Samuel Taylor, Mrs. George Reuter, Mrs. Frank Dressel, Mrs. S. Glickenhaus, Mrs. George Conley, Mrs. Fred Gumm, Mrs. Conrad Frey, Mrs. W. L. Hults, Mrs. Henry Bergfels, Mrs. C. H. Epp, Mrs. Roy Stout, Mrs. George Hogaboom, Mrs. Phillip Sievering, Mrs. William DeVoti, Mrs. Peter Labash, Mrs. R. F. Clark, Mrs. A. C. Calabrese, Mrs. Harry McGovern, Mrs. J. A. Weiss, Mrs. George Onksen, Mrs. Edward Faint and Mrs. G. Wagner.

Plans for Research on Electroplating at the Bureau of Standards

The two principal researches now supported by Government funds are chromium plating and zinc plating.

The study of chromium has thus far been directed principally to the development and control of the process now used successfully on printing plates at the Bureau of Engraving and Printing. In co-operation with the International Association of Electrotypers, a few tests have also been made upon the application of chromium to electrotypes to be used for very long runs or hard service. They now plan to make more fundamental studies of chromium deposition in order to determine what factors limit its general use in plating such as its low efficiency and poor throwing power; and to determine, if possible, how such obstacles may be overcome. Such a study will probably require at least two years' time of the two Bureau chemists now engaged upon it.

The study of zinc plating has been devoted so far chiefly to the acid zinc sulfate solutions. It is expected to complete this part of the investigation during the next few months, after which the conclusions will be published. Probably this work will be extended next year to include the zinc cyanide solutions.

In addition to the above researches, supported by Federal funds, a study of nickel electrotyping solutions

has been financed by the International Association of Electrotypers, who have spent about $3,000 per year for this purpose for nearly two years, and expect to continue such research.

Among the additional problems that have been suggested for study, especially if funds are available through the Electro-platers' Society, are (1) spotting out, (2) copper cyanide solutions, (3) brass plating, and (4) silver plating. These are not entirely independent, as a knowledge of cyanide plating solutions is involved in any study of spotting out; and a previous knowledge of copper and zinc cyanide solutions would help greatly in a study of brass plating. The program to be carried out may therefore depend not so much upon what subjects are to be studied as upon the order of study, as the subjects have already been tentatively decided upon.

The exact salaries to be paid to research associates that may be employed with such funds must depend upon their experience and qualifications. If a fund of $10,000 per year is raised, it will probably be sufficient to employ three chemists and to pay their necessary traveling expenses. This is equivalent to doubling the present research force of this section without materially adding to the overhead expense for administrative and clerical service. Laboratory facilities and equipment are now available for such an increase in force.

List of Subscribers to Date

Sterling Electro Plating Co., Chicago, Ill.	$50.00
C. B. Sheperd Co., Detroit, Mich.	50.00
Waukegan Chemical Co., Waukegan, Ill.	50.00
A. P. Munning & Co., Matawan, N. J.	50.00
Speakman Mfg. Co., Wilmington, Del.	50.000
Felt & Tarrant Co., Chicago, Ill.	*150.00
National Plating Co., Milwaukee, Wis.	50.00
Coleman Lamp Co., Wichita, Kans.	50.00
American Stove Co., St. Louis, Mo.	50.00
Pen Hardware Co., Reading, Pa.	50.00
Oneida Community Co., Ltd., Oneida, N. Y.	50.00
Smith & Wesson, Springfield, Mass.	50.00
Gillette Safety Razor Co., Boston, Mass.	50.00
General Motors Corp., Detroit, Mich.	50.00
Bell Laboratories, New York, N. Y.	50.00
Crown Rheostat & Supply Co., Chicago, Ill.	50.00
International Nickel Co., New York, N. Y.	50.00
North East Electric Co., Rochester, N. Y.	50.00
Stewart-Warner Speedometer Corp., Chicago, Ill.	50.00
Job Platers Association, Chicago, Ill.	50.00
Chicago Branch A. E. S., Chicago, Ill.	50.00
American Zinc Institute, New York, N. Y.	50.00
General Electric Co., Schenectady, N. Y.	50.00
Stromberg Motor Devices, Chicago, Ill.	50.00
Hanson & Van Winkle Co., Newark, N. J.	50.00
G. J. Nikolas & Co., Chicago, Ill.	50.00
Canada Cycle & Motor Co., Weston, Canada	50.00
Montreal Branch, A. E. S., Montreal, Canada	*150.00
J. B. Ford Co., Wyandotte, Mich.	50.00
Frederic B. Stevens Co., Detroit, Mich.	50.00
George A. Stutz Mfg. Co., Chicago, Ill.	50.00
Westinghouse Elect. Products Co., Mansfield, Ohio	50.00
Egyptian Lacquer Co., New York, N. Y.	50.00
Philadelphia Branch A. E. S., Philadelphia, Pa.	50.00
Milwaukee Branch, A. E. S., Milwaukee, Wis.	*150.00
St. Louis Branch, A. E. S., St. Louis, Mo.	5000
New York Branch, A E. S., New York	50.00
Detroit Branch, A. E. S., Detroit, Mich.	50.00
Toronto Branch, A. E. S., Toronto, Can.	50.00
Cincinnati Branch, A. E. S., Cincinnati, Ohio	50.00
Indianapolis Branch, A. E. S., Indianapolis, Ind.	50.00
Hartford Branch, A. E. S., Hartford, Conn.	50.00
The Meaker Co., Chicago, Ill.	50.00
THE METAL INDUSTRY, New York	50.00

*3 years.

International Fellowship Club Rounds Out First Year

The movement which was set on foot in 1925 at Montreal will mark its first anniversary at Newark, N. J., Sunday, June 27, 1926. This will be the first annual dinner which will be held at six P.M. in the Elks' Club, Newark.

There seems to be throughout the length and breadth of the continent a uniformity of opinion that those engaged in the manufacture and sale of products for the plating industry should get together occasionally to renew acquaintances and foster a feeling of good fellowship among themselves.

WILFRED S. McKEON

This spirit took definite form last year at Montreal with the election of a permanent organization as follows:

International Chairman—Wilfred S. McKeon, Greensburg, Pa.

International Vice-Chairman—George J. Lawrence, 3727 Pine Grove Avenue, Chicago, Ill.

International Secretary—John C. Oberender, 185 Church Street, New Haven, Conn.

There will be election of officers at this meeting.

Several other matters will be ironed out of interest to the men joining together in this movement.

At the last meeting which was held in New York, on February 20, 1926, the spirit shown was excellent and augurs well for the future of the organization.

The following members of the Club attended:

JOHN C. OBERENDER.

Wilfred S. McKeon, George J. Lawrence, John C. Oberender, J. Slattery, R. H. Pellington, W. W. Chase, H. E. Pearson, N. Tice, P. V. Cassidy, W. M. Campbell, W. M. Garbe, Fred Norgren, E. J. Robinson, W. L. Wittsen, H. J. White, John English, E. Homans, R. H. Mooney, E. A. Gysbers, J. Downs, E. L. White, M. M. McLean, E. H. Christ, J. Pearsall, A. H. Boyd, G. J. Tyndall, Frank J. Clarke, G. A. Tanner, H. E. Maynard.

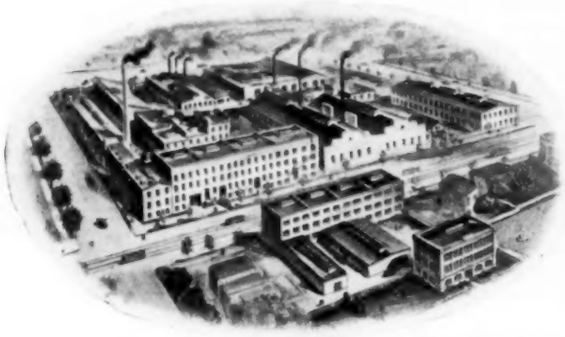
Plants to be Visited by the Platers

History and Description of the Hanson & Van Winkle Company, A. P. Munning & Company and the Raritan Copper Works

History of the Hanson & Van Winkle Company

The Hanson & Van Winkle Company was established in 1820, when the infant manufacturing industries of this country were dependent upon the old world for their supplies and for a period of 50 years it was engaged principally in importing and distributing drugs, chemicals and dye stuffs and acting as agents for manufacturers of acids, chemicals, etc., as they were established in the United States.

In the early seventies the necessity of engaging in manufacture was forcibly presented to the Company by the increase in the number of well established chemical industries; the keen competition and the consequent falling off of the profits of the agent or middleman.



HANSON & VAN WINKLE COMPANY, NEWARK, N. J.

Although the art of electroplating, one of the greatest inventions of the nineteenth century, had been greatly stimulated by the discovery of E. R. Elkington and John Wright, residents of Birmingham, England, as disclosed in their joint patent dated 1840, it was very little practiced in the United States in 1870. The Hanson & Van Winkle Company had added to their established business supplies required by the silver platers, such as batteries, battery parts, chlorides of the metals and the several chemicals and materials used for plating and polishing but it was not until about 1870 when a patent was granted to Dr. Adams for Sulphate of Nickel and Ammonia to be used as an electrolyte for depositing nickel, that their attention was directed to the dawning possibilities of the electroplating industry.

The development of electroplating was again greatly stimulated by the efforts of Joseph Wharton of Camden, N. J., to supply pure nickel from which the anodes and salts were manufactured and the Hanson & Van Winkle Company started in a small way to manufacture cast nickel anodes and salts of nickel and ammonia.

The United Nickel Company, of Boston, owners of the "Adams" patent demanded royalties from nickel platers using double sulphate. Suits were first instituted in New England and finally in New York and vicinity affecting the new manufacturing business of the Hanson & Van Winkle Company and in this emergency they joined with several of their large customers in Newark, N. J., to resist the suits.

A suit had been commenced against Edward Weston of New York for infringement and hearing of his vigorous defence and his patent granted in December, 1878, for improvements in the manufacture of metallic nickel, the Hanson & Van Winkle Company together with their associate customers undertook to aid Mr. Weston in his defence. The "Adams" patent was sustained but the manufacturers and the Hanson & Van Winkle Company were enabled to make satisfactory arrangements with the United Nickel Company, enabling the Hanson & Van Winkle Company to continue the manufacture and sale of nickel anodes and salts.

The Company was now closely identified with the nickel plating industry in its earliest stages and looked about for a wider field. During the progress of the patent litigation Mr. Weston called the attention of his associates to the fact that he had designed a practical dynamo suitable for the electrodeposition of metals. A factory was fitted up in Washington Street, Newark, N. J., and in 1874 the manufacture of the first low voltage dynamo made in the United States was undertaken.

The success of this dynamo which revolutionized electroplating was immediate and its sale was world-wide, the Hanson & Van Winkle Company receiving the highest award of the United States Centennial Commission at the International Exhibition at Philadelphia in 1876 and later at the American Institute in New York and the Exhibition Universelie Internationale of 1878 in Paris.

The advance of the industry was very rapid after the introduction of the dynamo, pure nickel anodes and salts, but was chiefly confined to nickel and silver plating.

The substitution of the sheet steel for the more expensive metals created a demand for brass, bronze, copper and zinc coatings, which was further increased by the introduction of lacquers suitable for protecting the electroplated finish upon chandeliers, electroliers, builders' hardware, lamps, etc.

The Hanson & Van Winkle Company introduced celluloid lacquers in 1886. Their success was immediate and the assurance that plated articles could be satisfactorily protected gave an added impetus to the demand for electrical equipment.

The original premises grew too small and the manufacturing plant was moved to Chestnut, VanBuren, Adams and Malvern Streets and at the present time the

plant of the Hanson & Van Winkle Company occupies about four acres.

The Hanson & Van Winkle Company has introduced many improvements in electroplating and its equipment. Among them are the interpole generator, the inside anode plating barrel, and apparatus for pickling, cleaning and plating wire cloth, corset steel, wire and the like by a continuous process, also an apparatus for electrozincing conduit pipe, in which all the preliminary cleaning processes and the plating are continuous. New forms of conveying apparatus for the continuous plating of stove work, automobile accessory parts and other articles have also been invented by the firm. In operation the various devices which have been marketed are turning out millions of feet of plated wire cloth yearly, large quantities of wire and conduit pipe while the capacity of the new automatic conveying apparatus ranges up to several thousand pieces of bumper bars and other pieces.

The enormous increase in the number of articles for which an electroplated coating was required soon created a demand for more efficient dynamos, for polishing equipment and supplies in great variety. New ideas in electric cleaning and new chemicals were introduced; their manufacture demanding a larger factory with many different departments. Demonstrating rooms and laboratories in charge of competent assistants where problems of benefit to the trade could be worked out were necessary and the growing tendency of the trade to the adoption of mechanical labor saving devices had to be met.

As electro-chemical advisers, the main factory and office at Newark have available a laboratory, under the direction of George B. Hogaboom, Electroplating Adviser, U. S. Bureau of Standards; Member of Board of Managers, American Electro-Chemical Society; Past President, American Electro-Platers' Society and Co-Author with Dr. William Blum, Chemist U. S. Bureau of Standards, and President of the American Electro-Chemical Society, of "Principles of Electroplating and Electroforming."

The Chicago offices and western territory are served by a Chicago laboratory under the direction of Fred J. Liscomb, known universally as "Dad" Liscomb, Vice Chairman, Electrodeposition Division, American Electrochemical Society.

Both Mr. Hogaboom and Mr. Liscomb have been connected with the electroplating industry for over thirty years, having served their apprenticeships as platers.

Electrical engineering is under the direction of Guerin Todd. The executives of this company are President, Van Winkle Todd; Vice-President, Fred L. Hewitt; Secretary and Treasurer, Edwin N. Boice. Mr. Boice has been connected with the company for thiry-three years, and its treasurer for ten years.

A United Family

The four Todd brothers are the third generation in the ownership and management of the Hanson & Van Winkle company. A brief description of their activities will be of interest to our readers.

Van Winkle Todd is the President and active head of the company, having spent fifteen years in the service thereof and in personal contact with the trade. His experience and knowledge of the line and its customers has been gained both from actual work in its manufacture and sales work among the customers.

Nelson Todd is Purchasing Agent and actively in control of buying the varied and special commodities used and manufactured. His service to the company dates over a period of eleven years.

Guerin Todd is a trained electrical and mechanical engineer, whose activities and experience control and guide the design and erection of the special and technical equipment and apparatus made by the company, including generators, their electrical drive and excitation, as well as all automatic conveyors, galvanizing and other machinery.

Rodwell Todd, the youngest of these four brothers, has the control of and responsibility for the receipt and disposition of all incoming orders, their disposition, routing and completion by the factory.

VAN WINKLE TODD,
President

THE FOUR TODD BROTHERS

EDWIN N. BOICE,
Secretary-Treasurer.

History of A. P. Munning and Company

When this company was founded in 1911, conditions in the electro-plating industry were vastly different from today. There were few really scientific investigations or business methods employed, the mortality rate in the industry was quite high and the influences surrounding the purchase and sale of plants, equipment and supplies were based on partly problematical and partly practical lines, rather than on exact knowledge. A. P. Munning, however, believed that concerns in this field, operating and manufacturing on broad, up-to-date practical and scientific principles, could be made successful. He also figured that, in time, such companies would help to strengthen the entire industry, both within and without, by co-operation between the various factors contributing to the manufacturing, selling, use and scientific sides of the industry. How well his efforts have been accepted can best be understood by a glance at the comparatively small building shown in the illustration, which was the home and the birthplace of his company, and the illustration showing the present arrangement of the eighteen buildings that comprise the plant and their distribution over a seven acre area, with a total working floor space of approximately 110,000 sq. ft.

A. P. MUNNING

MUNNING PLANT IN 1911

This plant is located at Matawan, New Jersey, approximately 29 miles from New York City, on the line of the Central Railroad of New Jersey and the Pennsylvania Railroad. The railroad siding provides facilities for proper handling and shipping of both incoming and outgoing materials. The business expanded so that a Western factory located at Chicago, Ill., was established in 1918, with a floor space of approximately 16,000 sq. ft., at 2920-2922 Carroll Ave. This factory not only manufactures many items, but also carries a complete line of the company's products in stock. Sales offices with District Managers were established in New York, Philadelphia, Detroit, Chicago, Cleveland, Milwaukee, Syracuse and Springfield, Mass., with distributors and jobbers in various important business centers throughout the United States.

A. P. Manning, President was for eleven years General Sales Manager of the Cutler-Hammer Manufacturing Company of Milwaukee, Wis., and prior to that time was with the General Electric Company. Due to his former business connections, he was able, when inaugurating this company, to put into effect, a great many of the principles which were successful in the companies referred to, and to surround himself with an able body of lieutenants and assistants, to whom the success of this company is largely due.

H. L. Zucker, the Vice-President, is generally acknowledged to be an authority in the composition and abrasive field. He was formerly President of the Geo. Zucker Company of Newark, N. J., which was founded by his father George Zucker in 1863, the first company to establish the compostion business in America. H. L. Zucker, therefore, has spent a lifetime, continuing the work of his father.

F. T. Taylor, Vice-President, is in charge of the sales and engineering department. He graduated from the Massachusetts Institute of Technology in 1903, and was one of the first designers of electro-plating generators employed by the General Electric Company. His knowledge of engineering, electro-physics and electrolytic methods has placed him in the foremost rank of men in this field, and it is largely due to him that the company occupies a very strong position in the manufacture and sale of automatic equipment, generators and the manufacture of high purity nickel anodes.

W. L. Neu, Assistant Sales Manager, has been connected with the company for a long time, having gotten into the business world after graduating as a lawyer.

The automatic machinery equipment of the company is

PRESENT PLANT OF A. P. MUNNING & COMPANY, IN MATAWAN, N. J.

under the supervision of E. N. Pike, a graduate of the Worcester Polytechnic Institute.

The manufacturing operations are under the supervision of L. E. Stocker, as Factory Superintendent. Mr. Stocker, for a great many years was a foreman and factory manager of the General Electric Company at Lynn, Mass.

The Financial Department, covering both credit and accounting is under the supervision of P. P. Munning, Treasurer, who has had wide experience in financial and credit matters.

The Purchasing Department is under R. J. Malkmus, who prior to coming with the company was connected with the Purchasing Department of the Celluloid Company, one of the largest concerns in its field and therefore brings to the company his wide experience of purchasing. One of Mr. Malkmus' slogans has always been "Quality First Regardless of Purchase Price."

The Shipping and Stores Department is under the guidance of H. G. Travis, a graduate of the United States Military Academy, at West Point.

The Munning Company takes credit for being the first concern in this industry to establish a Research and Development Department. This department has always been at the service of anyone connected with the trade and has been operated for the benefit of the trade as a whole, in the belief that what benefited the entire industry, certainly must in turn benefit the company. This department is under the direction of A. P. Munning, 2nd, who is a graduate of the Massachusetts Institute of Technology, having taken a Master's Degree in chemical engineering. Under him, three separate laboratories are maintained for the purpose of research and the maintenance of standards.

(1) A demonstrating laboratory, completely equipped with plating tanks, polishing wheels, buffing equipment, automatic equipment of various kinds, where products are put through in exactly the same manner as would occur in practice, and all factors are discovered and specifications determined before recommendations are made.

(2) A laboratory for checking raw material received at the plant, in order to make certain that all raw materials used meet certain pre-determined standards of quality before they go into the finished product. This laboratory is also available to the company's customers for the purpose of analyzing plating solutions, anodes, etc. It has proved itself very valuable to the company's clientele when problems of a troublesome nature have to be solved.

(3) A special laboratory where compositions for cutting and polishing operations are developed. The chief chemist in this laboratory is constantly engaged in investigating new formulae and in checking standards of manufacture throughout the plant. For instance, for over fifty years Acme White Finish has been one of the leaders in the white finishing compound field. The company has consistently tried year after year in every way possible to better its own standards, but in the case of Acme White Finish, has been unable to do so.

A technical library is also maintained for the use of the chemists and others in the company, wherein all activities and developments of the plating industry are recorded and made available for future reference, to customers and employees alike.

In order to achieve the maximum of success, it is necessary to have the very best practical and technical information available among his representatives in the field. Mr. Munning chose F. J. Clark, who has charge of the New England territory; C. G. Backus, who has charge of the New York territory; P. H. Bergin; who has charge of the Detroit territory and E. Lamoureux, who has charge of the Chicago territory, as his initial men in the field. He constantly refers to these four men as the "old guard".

The development of sales was further augmented by the addition of such men as E. H. Christ, assistant to Mr. Clark; H. F. Beam and W. A. Brand, Jr., Assistants to Mr. Backus. F. S. Bruen in charge of the New Jersey territory; J. A. Munning in charge of the Philadelphia territory; F. G. Cyrex in charge of the Cleveland territory; Messrs. Donnelly and Crumpton in the Chicago territory; Mr. Stratton, in charge of the Milwaukee territory and J. C. Pearsall, in charge of the Northern New York territory. In addition to these, there are special salesmen such as A. H. Boyd and M. J. Moll, who have devoted their time to the introduction of the automatic end of the plating and polishing room.

Going now to the question of factory procedure, the business is divided roughly into eight departments:

(1) The manufacture of compositions and its allied products which has two separate buildings. The company has a department for the manufacture of its own tin cans, believing that it should control every step of manufacture to insure thorough fitness of its product.

(2) A rouge department where it manufactures and calcines all of its own raw material. The company is the first one and the only one in America calcining its own raw oxides.

(3) A foundry, where nickel, brass, copper, cadmium and other metal anodes are cast. Since its inception, not one pound of scrap metal has been used in the manufacture of any of its anodes. The purest metals obtainable are melted down in reverberatory down draft pressure type furnaces, and are then cast in one or another of the standard or specialized forms of anodes.

This department produces such standard and improved types of anodes as the 2-bar type, diamond shape type, the quoit type, and is now preparing to put on the market an absolutely new type of anode.

(4) The Polishing Wheel and Buff Making Department. This occupies approximately 25,000 sq. ft. of floor space. It is one of the busiest departments of the company. The cloth used to make buff wheels is always carefully checked as to its weave to make certain that it meets the specifications found best suited for the requirements of the industries. All buffs are carefully assembled and balanced, centered, trimmed and trued up, so that they are already faced and ready to use when received by the consumer. In this department are manufactured, in addition to all types and quantities of pieced buffs, and loose buffs, the Triplex buffs, the Ready-to-Use trued and faced buff of all types.

(5) The brush department, while occupying a smaller space than the buff department, is another section of interest. All brushes made are of the hand drawn type, the tuffts being securely held in place with wire. After the drawing operation, the brushes are trimmed to size.

(6) The tank department. Here all the tanks are made, assembled and tested before being shipped. In the tank shop, also, all of the company's rotating plating barrels are manufactured.

(7) The machine shop is maintained for the manufacture of automatic plating machinery. Here all of the automatic machines of the company are manufactured and tested before being shipped. The building occupies a space of approximately 300 feet by 100 feet and was erected several years ago.

(8) A building devoted entirely to the manufacture of cleaning compounds.

In addition to the above buildings, a department is maintained for the manufacture of emery and emery cakes, for the sorting and shipping department and for the storage of raw materials.

From the above resume it will be apparent that the company has always had faith in the industry. Visitors will be well repaid for a visit to its plant.

The Raritan Plant of the Anaconda Copper Mining Company

The plant of the Raritan Copper works, the eastern copper refinery of the Anaconda Copper Mining Company, is located twenty-three miles from New York, in the City of Perth Amboy, at the mouth of the Raritan River.

The plant covers an area of forty acres and has a present refining capacity of thirty-eight million pounds of copper per month, which is being increased to forty-five million.

The crude material is "blister copper" which comes from various smelters located in the western part of the United States, South America, Africa and Europe.

The regular products of the plant include all commercial forms of refined copper, such as wire bars, ingots, ingot bars, square and round cakes, wedge bars, slabs and billets. The by-products recovered are refined silver and gold, platinum, palladium, selenium, tellurium, copper sulphate and nickel sulphate.

The functions of a copper refinery are first to produce the high grade conductivity copper required by the electrical industry, and the industrial arts, and second to recover the various amounts of the precious metals, gold and silver, which have concentrated from the original ore to the blister copper.

In addition to the precious metals from its own slime, the Raritan refinery refines the precious metals produced at other plants of the Anaconda Copper Mining Company, and in 1925 refined 405,803,075 pounds of copper, 20,578,003 ounces of silver and 128,590 ounces of gold.

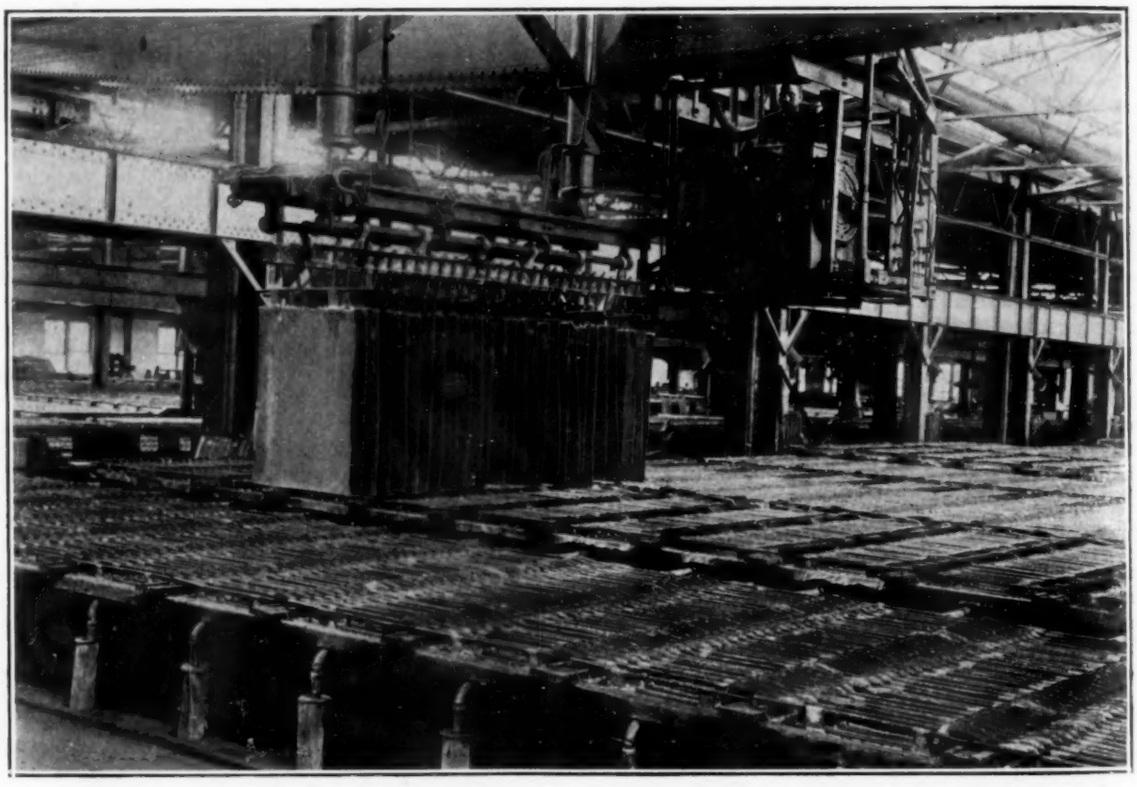
The blister copper arrives at the refinery both by lighters and railroad cars, and after transferring to the plant's industrial cars, is weighed, sampled and melted into anode shapes to go into the electrolytic tanks. There are four blister furnaces for the melting of the blister copper, with a total capacity of 2,470,000 pounds of copper per day. One of the furnaces has at times cast over 800,000 pounds of copper per charge, which is a record production for any type of metallurgical furnace.

The anodes average 490 pounds in weight and are 28 inches wide, 37 inches long and 1⅝ inches thick. They are cast with lugs to facilitate hanging in the electrolytic tanks.

The anodes are refined in two tank houses, each containing four electrical circuits of 7,000 amperes. The total number of tanks being 3,456. Twenty-nine anodes and thirty cathodes, equivalent to a current density of fifteen amperes per square foot, are placed in the tanks. The tanks in each electrical circuit are connected in series, the anodes of one tank being on a common bus bar with the cathodes of the adjoining tank.

Theoretically, according to Faraday's law, one ampere per day will deposit one ounce of copper. Ninety per cent or more efficiency, based on this figure, is maintained at all times.

Under the operating schedule of the tank houses the anodes remain in the tanks thirty days. During this time three liftings of cathodes of ten days each are made. It has been found impractical to deposit as heavy a cathode as the anode, and the cathodes after electrolysis average 135 pounds in weight.



CATHODES OF REFINED COPPER.

The voltage on the cells and on the circuits is maintained as low as possible, and is dependent upon the following factors: 1—current density; 2—spacing between the electrodes; 3—composition of the electrolyte; 4—temperature of the electrolyte. The electrolyte contains about 200 grams per liter (26.7 oz. per gal.) of sulphuric acid and 40 grams per liter (5.34 oz. per gal.) of copper present as copper sulphate. It is heated to 145° F. and is circulated through the tanks at the rate of four gallons per minute.

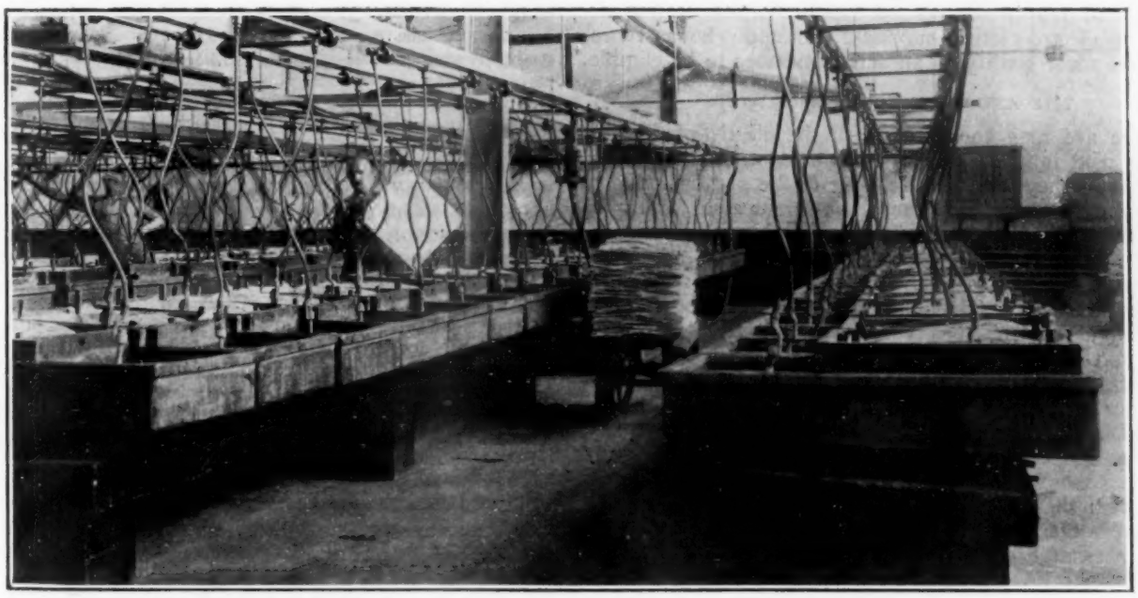
Under this condition the voltage per tank is about .24 volts. Of the original impurities in the anodes, arsenic and nickel dissolve and foul the electrolyte, and it is in the purification system of the electrolyte that a high grade of single nickel salts is recovered. The more noble metals, such as silver and gold, as well as selenium, tellurium, lead and antimony, will drop to the bottom of the tank and form what is known as "electrolytic slime."

The cathodes are melted in reverberatory furnaces and cast into the commercial copper shapes used by the various rolling mills and alloy manufacturers.

The electrolytic tanks are cleaned at the end of each thirty days' run and the slime pumped to the silver department.

The slime is given an oxidizing roast to oxidize the copper which is leached out with sulphuric acid. The slime is further refined in small reverberatory furnaces to Doré metal. This metal is an alloy of silver and gold with a trace of impurities. The silver is parted from the gold by electrolytic methods, the so-called Thum and Moebius systems being employed. These two processes use the same electrolyte, a neutral mixture of silver nitrate (60 grams per liter) and copper nitrate (40 grams per liter) but differ in the method of suspension of the electrodes in the solution.

In the Moebius system the electrodes are hung vertically, the anode being contained in a canvas bag to hold the gold slime. Movable arms are used to knock the deposit of crystal silver from the silver cathode sheet, which at the same time agitates the solution.



THUM CELLS IN SILVER REFINING.

In the Thum system, the electrodes are horizontal. The cathode, a carbon and graphite plate, is placed at the bottom of the earthenware cells and the anode is suspended over the cathode in a basket lined with two layers of cloth acting as a diaphragm. No mechanical circulation or agitation of the electrolyte is attempted in the Thum system, but the cathodic deposit of silver crystal is scraped toward the front end of the tank every two hours, this operation agitating the solution to some degree.

In the Thum system a current of one hundred and fifty ampere per each cell is used which is equivalent to a current density of fifty amperes per square foot of active cathode area which total about three square feet per cell.

The slime from the parting cells is known as "gold slime," and after refining with sulphuric acid to remove the silver, is melted and cast into gold anodes containing small percentages of platinum and palladium as "impurities."

These anodes are refined electrolytically using the well known Wohlwill process. In this process the electrodes are hung vertically. The cathodes being thin sheets of rolled gold. The electrolyte is a mixture of gold chloride (100 grams per liter) in ten per cent hydrochloric acid. The solution is agitated by a small Pohlé air lift and heated to 170° F.

In the former electrolysis of copper and silver the more noble metals have been insoluble and have formed a deposit of slime. In the gold electrolysis, however, whatever platinum and palladium was present in the anodes dissolves in the electrolyte. When the concentration of these metals has reached a total of fifty grams per liter, the metals are removed from the electrolyte and refined by chemical methods.

During the course of the electrolytic refining processes, various interesting by-product metals are recovered, such as selenium and tellurium. Selenium is used by the glass industry as a decolorizer for glass. No one has as yet discovered a real use for tellurium, but a small quantity of this metal is used in radio, and a solution of tellurium oxide in hydrochloric acid is used by electrocplaters as a dip for silver ware. A high grade of single nickel salts which has been purified and produced under chemical control is used very extensively in the nickel plating industry.

The copper cathodes as they come from the tanks are used by electroplaters as copper anodes in the deposition of copper either from cyanide or acid solution. The rolled copper anodes used by the electroplaters are made by rolling either a wire bar or slab of refined electrolytic copper.

The Raritan plant does not have a rolling mill but its copper products which deal directly with the electroplaters are rolled and manufactured by the American Brass Company.

Progressive Policies for the Platers' Society

1. Admit the Assistant Foreman Plater

2. Release Papers for Outside Publication

Written for the Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

The Fourteenth Annual Convention of the American Electro-Platers' Society will be held in Newark, N. J., June 29-July 2, 1926.

This convention should be one of the greatest conventions the society has ever held. The exposition feature has been greatly elaborated upon in the coming convention and will prove of great interest to the members and visitors. The factors that enter into the electro-plating industry are many and varied and the featuring of these products should enable the society to increase the exposition idea each year to its advantage.

The American Electro-Platers' Society is steadily going forward in membership each year. Through its official body it is seeking to accomplish the objects of the society; the increase and dissemination of knowledge concerning the art of electro-deposition in all its branches. Its active membership consists of foremen electro-platers who must have been actively engaged in electro-plating for at least five years. Its associate membership consists of graduate chemists or electro-chemists who have been actively engaged in electro-chemical engineering for a period of three years, and representatives of supply houses dealing directly in electro-plating supplies. A supply house representative must qualify as an active member to be eligible.

THE ASSISTANT FOREMEN PLATERS

There are men connected with the electro-plating industry who in a great many instances are chemists; in many ways they are more valuable to the plating industry as producers than as chemists or engineers. Many of these men have been actively engaged in the plating industry for many years. Yet they are refused admission in the society because they have been classed "assistant foremen platers." They have in many instances all the knowledge that the society requires, but they are ostracized and isolated because, unfortunately, they are what they are—assistant foremen platers. No other technical or educational society would refuse them admission into its ranks. They are eligible to active membership in such societies and could, by their ability, reach its leadership, but the American Electro-Platers' Society holds them off as though there were a taint in their blood; as though they were not human. The American Chemical Society, the American Electrochemical Society, the American Society for Steel Treating and the American Foundrymen's Association all accept the assistant foremen platers as active members. I know because I belong to three of the above organizations and to several others. The assistant plater is an important part of the great metal industry of the United States and should be recognized. He has been knocking at the door of the Supreme Society for admission, even as an associate, ever since the inception of the society; he is still knocking and he must be heard.

The first regular meeting of the American Electro-Platers' Society (then the National Electro-Platers' Society of the United States and Canada) was held at the Hotel Chelsea, New York City, March 6, 1909. The assistant foreman plater came to the door but was refused admission. His case for admission was proved by a strong editorial in THE METAL INDUSTRY of June, 1909, which is reprinted in part, below:

THE FOREMAN'S ASSISTANT—HOW SHALL HE ADVANCE?

The assistant to the foreman in a plating or other establishment has, even under ordinary conditions, a difficult position to maintain. He must perform his work in a manner satisfactory to his superior, take an interest in his work and be eager to advance. On the other hand, he must not seem to have any very strong foremanship aspirations, or he is looked upon with suspicion.

Why should this be? Should he not be encouraged in every possible way to advance himself in the line of work he has chosen? He certainly should, for it is from the ranks that the head must come. Our leaders cannot live forever, and who shall take their places but the assistant? A man in charge of an entire plant or only a department can only reflect credit and reputation upon himself by the excellence of his teaching, and the quality of the work he produces depends largely upon the skill of his assistants and their ability to carry out his instructions.

A man, expert in his line and superior in his executive ability, need never be afraid to teach and fit his assistants for higher positions. There have been isolated cases, it is true, where an assistant superseded his foreman, but this was probably bound to happen anyway, due possibly to some outside conditions, or perhaps some weakness developed in the foreman himself.

There are several ways by means of which a young man either with or without college training can consistently advance himself. He can continue to study and read current literature. He can study the methods and practices of his superiors and associates of more practical experience. Lastly, he can or rather should be able to join the societies and associations devoted to the advancement of the particular art he is engaged in.

Let the young men in, encourage them to seek for more knowledge and to get at the theory that is coincident with practice. When a foreman adopts the idea of secrecy and aims to puzzle his assistants with the mysteries of science, nine times out of ten it is because he is actually not sure of himself and is holding his own position by means of some pet process that he fondly imagines is known to himself alone.

A foreman was heard to say in this connection: "Do not let an assistant join an association of which a superintendent or foreman is a member, for it would be embarrassing to the latter to have to admit ignorance or perplexity in the presence of the former. Let the assistant work out his own salvation as we have done." This sounds all right—to the foreman, but to the world at large it smacks of a narrow-gauge view. When the foreman was getting his experience there were doubtless not the openings to be had for enlightenment that there are today.

No man need be ashamed to admit honest ignorance, and judging from the state of some of the arts in their relations of science and practice, it is not at all surprising that we should hear some expressions as above quoted. Let industrial associations be formed and make the constitution so broad and liberal that it will allow the admission of anyone, who is in earnest and will strive to aid in the work of solving difficult questions, thus by his interest and co-operation, helping others and himself at the same time.

On page 248 of this issue will be found a letter from one of the unfortunate assistant platers. In the course of years, I have received perhaps a hundred letters of the same type; all with the same knock at the door. The writers all thought that the Founder of the Society should have built an intelligent structure with more than one door. He intended to do so but he has been shackled by the membership of the society who still are blind to its possible future greatness because they forget that, as time elapses, the assistant platers must of necessity supersede them.

I am, personally, almost as unfortunate as the poor

assistant plater. I have no voice to raise in their defense except with my pen and it will be raised continually until the assistant platers' knock opens the door of admission into an organization in which its Founder is declassé, ostracized and isolated because failing health made a change necessary in his position many years ago.

If the officers of the Supreme Society really wish to make this the greatest convention ever held; if they wish the American Electro-Platers' Society to ascend in its sphere of usefulness, let them open its doors wider, so that the future foremen platers may obtain membership in its ranks. There is always a way to accomplish a purpose if we have the will to do it. Broaden your vision; open your eyes wider so that the light of wisdom may shine into them.

THE SOCIETY'S NEED FOR PUBLICITY

Another great need of the Society needs is publicity. It cannot be broadcasted through the Monthly Review because that publication is for the membership of the Society only. It is only through the various technical and business journals that greater publicity can be given to the society without increasing the cost to its membership. In this connection papers that are read before the society should be released for outside publication within a reasonable period, just as in other great societies.

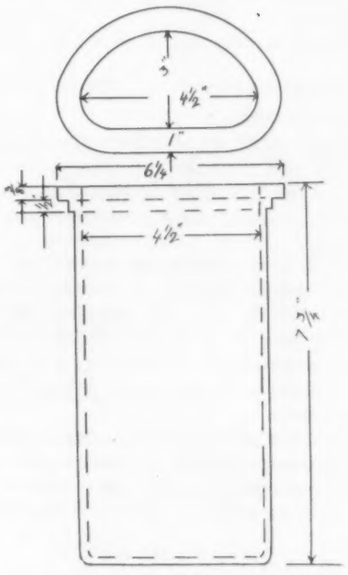
Unfortunately the funds available for publication of the Monthly Review are not sufficient to enable the editor to double its pages of reading matter. Consequently, many valuable papers are never printed and the membership at large does not obtain its full returns as they should. By printing this overflow in outside publications, the Society receives publicity at no cost to its membership.

Let it be written in the history of the Fourteenth Annual Convention and the work that it accomplished, that the door was opened to the assistant foreman plater and that the spotlight of greater publicity was allowed to shine on the Society. Both of these advances will aid immensely in the dissemination of knowledge about the electro-deposition of metals.

Nickel Muffle

Q.—Please advise where we can procure a cast muffle made of pure nickel which would stand a temperature of 2,600° F. inside the muffle. The enclosed sketch will show you the size of the muffle.

A.—The sketch submitted with this question indicates that the inquirer had in mind a casting that would withstand a temperature of 2,600° F. inside the muffle. Castings of pure nickel are extremely difficult to make. Among the few nickel castings that are made commercially may be mentioned anode castings for nickel-plating. These are made by carburizing the nickel, so that its melting point is much lowered and tin or cast iron may also be added with the same object in view. This method of procedure, however, would be out of the question with a muffle that is to withstand the high temperature mentioned. It is suggested that you have a muffle made from pure electrolytic nickel, rolled into sheet form. A purity of 99.8 per cent malleable nickel or higher is desirable. This material could be bent into the form of a muffle and one end could be closed by a flanged piece. The joints could be riveted together or welded, if necessary. If sheet nickel is used, it would probably be unnecessary to use anything heavier than ½ inch material.—JESSE L. JONES.



SKETCH OF MUFFLE

Belt Dressing

Q.—We would be interested to introduce a first class American belt dressing into Germany which does not contain either acids nor resin; indeed, one of the principal ingredients should be vegetable oil.

One such product is at this time being sold in Europe. This belt dressing is sold at a very high price and many works don't take it up for that reason.

We have no doubt that there are other firms in the United States who make a similar dressing. We would therefore be much obliged to you if you could get us in touch with the most suitable best dressing.

A.—A number of manufacturers make an oil dressing which is used by the belt manufacturers. They contain no acids or rosins of any nature, and therefore will not injure or harden the leather. Commercial castor oil with a small portion of Neatsfoot oil makes a good general dressing and should be applied to both sides of the belt. Keep the belt clean, soft and pliable.

Any dressing which clings to the belt and pulley will pull the fibre of the leather out and cause adhesions to gather on the pulley. Of course, the lumpy gatherings on the pulley will cause the belt to jump, allowing pockets of air to gather between the face of the pulley and the belt which eventually will reduce the power.—W. L. ABATE.

Soap in Nickel Solution

With regard to Problem 3,504 in your March issue, I wish to say that a half bar of laundry soap in the cold nickel solutions should not have done much damage. I would suggest the following: Pass steam through the solution. Take a piece of cheesecloth, back it up with screen, place a few pieces of either iron or steel in it and run current into it with high voltage for 1 to 2 hours. When the solution is again cold, then add a little free acid and sodium chloride.—ANDREW V. RE.

Diseases of Brass Deposits

Symptoms, Causes and Cures

Written for The Metal Industry by WILLIAM VOSS*

The plater who has the knowledge and means of making quantitative determinations of his brass solution, will as a rule experience little trouble with his deposit. But since the greater majority of platers have to depend only upon their practical knowledge, the following discussion will not go amiss.

It is not the writer's intention to go into the matter of formulae for brass deposits, since the fundamental bases of good brass deposits are practically all alike, namely:

Cyanide (sodium or potassium)
Copper in any of its various forms—carbonates, hydrates, cyanides, etc.
Carbonate of soda
Zinc carbonate or cyanide.
Ammonia in any one of its forms, chloride, carbonate or hydrate

Then in addition we have the platers' choice of

Rochelle salts
Arsenic
Phenol
Caustic soda
Bisulphite of soda.

Fundamentally all brass solutions are composed of four, five or six salts and even though these salts may be properly balanced, there are other factors that govern the color of the deposit, among them, temperature and current density.

Formulae for brass solutions have been worked out based upon the metal contents of the copper and zinc salts recommended. Many a good solution has been ruined by not knowing how properly to combine the various salts from the very beginning. Therefore, it is very important that some of these salts be not converted into insoluble salts or compounds.

I wish to correct an impression that seems to be quite general with platers, and that is that cyanide solution must be hot when combining with other salts. In fact, we might draw up here a list of "do not" cautions.

LIST OF "DO NOTS"

Do not dissolve copper or zinc salts in hot cyanide.

Do not add the cyanide to copper or zinc salts.

Do not add the zinc salts by weight. (Let me make this clear. It can be done, provided none of the copper salts have been converted into insoluble salts, the percentage of metal in each salt is known and care has been taken in compounding the formula.)

Do not add ammonia, caustic soda or similar salts if your solution has an excess of zinc since these salts bring up the zinc.

Do not try to add arsenic unless its action is understood.

BRASS SOLUTION

A brass solution is not difficult to make provided a simple form is followed.

Fill the tank half full of cold water and suspend the weighed quantity of cyanide in baskets or cloth bags, just below the surface of the water. Do not throw the cyanide into the bottom of the tank since the solution becomes saturated in the lower level, causing the cyanide to dissolve slowly. When the cyanide is dissolved, the copper weighed copper salts which have been mixed with water to the consistency of thin paint, are slowly added to the cyanide solution with constant stirring. Care must be exercised that the solution does not become too hot; not over 140° F. If copper is added to a hot cyanide solution, some of the copper is converted into insoluble salts which the plater refers to as "mud." If too hot, allow to cool before making further additions. Heating of the solution will also cause the asphaltum lining to run or sag, in the case of lined tanks.

After the copper is added, the sodium carbonate is added. The solution is now allowed to cool. When cool, the zinc salts which have been previously dissolved in as small a quantity of cyanide as necessary to take it up or dissolve them, are now slowly added to the copper solution. A piece of work should be hung on the cathode rod, the current turned on as the addition of zinc is slowly made, and the solution stirred. The deposit will begin to change from copper to bronze. At this stage the addition of bisulphite of soda which has been previously neutralized with carbonate of soda, may be added or Rochelle salts or caustic soda may be added. A small quantity of ammonia as a hydrate or sal-ammoniac may be added. Care must be exercised in adding ammonia or caustic soda since these salts, if in excess, will cause straining of the deposit and bring up a strong zinc color.

Additions of bisulphite of soda must always be neutralized with an alkali salt, since the addition of bisulphite of soda to a cyanide solution will cause the cyanide to break up and some of the cyanogen will be given off. These fumes are very poisonous and must not be inhaled. Also, we lose the agent (free cyanide) which is an important factor in the proper operation of the solution.

You will note that I recommend that ammonia be added before completing the addition of zinc salt. Using this method avoids the danger of getting too much zinc in solution and results in better control of the solution.

The following proportions will illustrate the proportions of copper and zinc required to produce the various deposits of bronze and brass.

Copper	90	per	cent	10	per	cent	zinc	bronze
"	80	"	"	20	"	"	"	green brass
"	70	"	"	30	"	"	"	yellow brass
"	60	"	"	40	"	"	"	pale brass

FACTORS IN BRASS SOLUTIONS

As previously stated, the solution may be properly balanced in regard to metal content and still produce a very unsatisfactory deposit. The factors governing such conditions are:

Temperature
Current density
Cyanide
Ammonia
Concentration of solution
Alkali salts
Condition of anodes, composition of same, and whether cast or rolled.

When experiencing trouble with a brass solution, the first thing to do is to remove any undissolved salts in the bottom of the tank. I have seen tanks with varying amounts of these undissolved salts. In fact I distinctly recall the difficulty one plater had with a 2,000 gallon solution that contained 8 inches of undissolved salts in the bottom of the tank, always ready to neutralize the free cyanide and cause all kinds of trouble. In another

* Representative of the Hanson & Van Winkle Company in the Metropolitan District, New York.

case I saw a bronze solution of 8,000 gallons to which tin salts had been added in an effort to get a bronze deposit. When the precipitated tin salts were removed they filled five barrels. To attempt to make additions to a solution that contains undissolved copper and zinc salts in various amounts would be folly.

FUNCTIONS OF CONSTITUENTS OF BRASS SOLUTIONS

Each particular constituent has some function to perform.

Metal: To obtain a satisfactory deposit the solution must contain a certain amount of metal. If the solution lacks metal, the deposit will be thin. If the metals are not in the proper proportions, the deposit will not be brass.

Current: If the current is too low, more copper will be deposited and the deposit will take on a bronze color. If current is too high, more zinc will be deposited, the color will be pale, and the deposit may be burned—that is rough on outer edges.

Cyanide: Cyanide is used to keep the metallic salts in solution and also acts as the medium for dissolving the anodes. The proper amount of free cyanide is difficult to govern in a solution in which brass anodes are used, and as a rule too much free cyanide is used in an effort to keep the anodes clean and in working condition. Since too much free cyanide is not beneficial, other salts have been utilized in an effort to keep the anodes clean.

Rochelle Salts: Rochelle salts helps to keep the anodes clean, provided that there is ample active anode surface.

Caustic Soda: Another of these salts.

Carbonate of Soda: (Soda ash), a conductor; reduces internal resistance.

Bisulphite of Soda: A sulphite of soda; a clarifier; clears up the deposit.

Arsenic: In very small additions; a brightening agent.

Phenol: Also a brightening agent.

Ammonia: A clarifier; also gives the plater a conducting agent, if used moderately and with care; a medium that assists the zinc to combine uniformly with copper and helps to keep the excess cyanide down.

DISEASE	CAUSE	CURE
No deposit.	Too much cyanide (violent evolution of hydrogen gas).	Increase metal content but add no cyanide.
	Generator not developing current. Open circuit. Short circuit.	Look over electrical system and repair.
	Anodes are coated or polarized.	Increasing the resistance and decreasing the current. Use either 80-20 cast anodes or copper anodes. If the latter method is used, small additions of zinc salts must be made from time to time. Avoid brass anodes that are hard rolled and anodes with too high zinc content. Such anodes do not break down properly, and in an effort to get them clean, too much cyanide is often used. The addition of Rochelle salts to the solution will help to keep the anodes clean.
Blistered deposit.	Dirt, improper cleaning or oxidized surface.	Look to cleaning conditions.
	Too much cyanide or alkali salts.	In the former condition, add metal. In the latter, reduce the solution with water, and rebuild if necessary.
	Current too strong or solution too dense. This usually causes a hard, brittle deposit and will also cause blister.	Reduce with water if too dense. Reduce current to proper point.
Rough deposit.	Undissolved salts or dirt on surface while being plated.	Remove undissolved salts. Clean work properly, removing oil, grease, pumice, emery paste, etc.
	Current too strong, deposit being burnt.	Reduce pressure (voltage).
	Solution too strong.	Dilute with water.
Dull deposit.	Solution is too concentrated.	Reduce with water. The addition of a little ammonia will help to clear the deposit.
	Current too high.	Reduce with proper rheostat; govern by use of voltmeter. The addition of arsenic which has been previously dissolved in caustic soda will brighten up such deposits. Use about ½ to 1 ounce of trioxide of arsenic per 100 gallons of solution. The addition of phenol as a brightening agent is also recommended, using 2 to 4 ounces per 100 gallons of solution. The addition of bisulphite of soda will help to clear the deposit.
	Solution lacks free cyanide.	Increase cyanide contents, but avoid excess which will cause the anodes to be bright and shiny. The latter condition when brass anodes are used, indicates excess of cyanide.

This article will be concluded in an early issue—Ed.

Analysis of Plating Solutions

Approved Methods for Analyzing Nickel, Copper, Zinc, Brass, Silver and Gold Solutions. From the Monthly Review, March, 1926

By OLIVER J. SIZELOVE

Newark Branch, American Electro-Platers' Society

INTRODUCTORY

In the past few years, chemistry has played a very great part in the successful electro-deposition of metals. The plater, who has been able to control his solution by analysis, has had an advantage over his less fortunate associates.

The time has come, when the plater of the future, must be able to control his solution by analysis or give way to one who can. The assistant platers of today are studying chemistry, and in the course of a few years, will be able to do what the majority of the platers, cannot do, unless he will devote some of his spare time to the study of chemistry. Realizing their needs, following will be found the analysis of the different solutions, and anyone with a little practice can become enough of a chemist to be able to maintain his solution by chemical control.

The methods given have been taken from various text books on chemistry, and have been simplified as much as possible, so that the plater can get what he requires without being compelled to study for years, as was necessary for the writer to do.

If there is any further information desired by any member of the Society, it will be given most cheerfully, and if the analysis of the different solutions will be the means of helping my associates, I shall consider myself fully repaid indeed.

NICKEL SOLUTIONS

For the analysis of this solution, what is known as Moore's method, is used, and it is based on the fact that if to an ammoniacal solution of nickel containing silver iodide in suspension (silver iodide being almost insoluble in weak ammonia) there is added sodium cyanide, the solution will remain turbid so long as all the nickel is not converted into the double cyanide of nickel and sodium, the slightest excess of cyanide being indicated by the clearing of the liquid, and, furthermore, this excess may be exactly determined by adding a solution of silver nitrate until the turbidity is reproduced.

STANDARD SOLUTION

Silver Nitrate N/10 Ag NO_3 solution

Weigh 17 gms. of silver nitrate c. p. and dissolve in a small amount of distilled water and then transfer to a litre flask and dilute accurately to 1,000 cc.

The silver nitrate should be the C.P. salt and if care is used in making the standard solution it will be ready for use. It can, however, be checked against a solution made from pure silver foil.

Sodium Cyanide N/10 Na CN solution

Weigh 9.8 gms. sodium cyanide, dissolve in water, transfer to litre flask and dilute to exactly 1000 cc.

Dissolve 1 gm. of pure nickel foil in 5 cc with water and add 10 cc of NH_4OH and then dilute to 150 cc with water. Add .2 cc of a 10% KI solution.

Note: Two separate burettes should be used, one to contain the Na CN solution, the other the N/10 Ag NO_3 solution. Add sufficient N/10 Ag NO_3 until a permanent cloudiness is obtained. Titrate with Na CN until the solution is clear. Add N/10 Ag NO_3 again until a faint cloud appears. This is to check against an excess of Na CN. Titrate again to clearness with Na CN being careful not to go beyond end point.

Calculation for Factor

Subtract from the number of cc of Na CN the product obtained by multiplying the number of cc N/10 Ag NO_3 used by its factor (see standardization of N/10 Ag NO_3 solution). The number of cc of Na CN found divided into the weight of the nickel=the factor for the Na CN solution.

Example: .1 gm. of nickel required 1.9 cc of N/10 Ag NO_3 and 37.6 cc Na CN
1 cc N/10 Ag=1.04 cc of Na CN (see note)
1.9x1.04=1.976=Corrected N/10 Ag NO_3
37.6—1.976=35.624=cc of Na CN actually used for the nickel solution.
.1÷35.624=.0028.
∴ 1 cc of N/10 Na CN solution=.0028 gms. of nickel.

Note: 1.04 was obtained by standardizing the Na CN solution against N/Ag NO_3 solution.

Take 10 cc of Na CN solution and dilute to 50 cc with water, add .2 cc of 10% KI and titrate with N/10 Ag NO_3 until a faint cloudiness persists.

Example: 9.6 cc of N/10 Ag NO_3 used.
10÷9.6=1.04.
∴ 1 cc of N/10 Ag NO_3=1.04 cc N/10 Na CN.

ANALYSIS OF NICKEL SOLUTIONS

NICKEL CONTENT

Take 5 cc of solution, dilute to 50 cc with water, add a small crystal of tartaric acid ($H_2C_4H_2C_2$) to hold the iron in solution Add 5 cc of NH_4OH and dilute to 200 cc with water. For an indicator add a few drops of a 10% solution of KI. Titrate with the standard Na CN solution, using the same method as used for standardizing Na CN against nickel.

Example: If the 5 cc of nickel solution required 47.2 cc of the Na CN solution and .5 cc of the N/10 Ag NO_3 solution the following calculations should be made:

1.04=factor for the standard N/10 Ag NO_3 solution
.50=cc of N/10 Ag NO_3 used

.520=corrected number of cc used
47.20=cc of Na CN used
.52=cc of N/10 Ag NO_3

46.68=cc of Na CN, corrected amount
.0028=factor for Na CN solution

37344
9336

.130704=gms. of nickel in 5 cc sample taken
.130704x26.6=3.47 oz. of nickel per gallon of solution.

CHLORINE CONTENT

Take 1 cc of nickel solution, dilute to 50 cc with water

in a 150 cc beaker. Add 1 cc of 10% potassium chromate solution (K_2CrO_4) as an indicator. Titrate with N/10 Ag NO_3 until solution acquires a red buff color.

Calculation: 1 cc N/10 Ag NO_3=0.003546 gms. Cl
1 cc N/10 Ag NO_3=0.00535 gms. NH_4Cl
1 cc N/10 Ag NO_3=0.00585 gms. Na Cl

CHLORINE CALCULATED AS NH CL

Number of cc N/10 Ag NO_3x.71=oz. of NH_4 Cl per gal. of nickel solution.
Number of cc of N/10 Ag NO_3 used x 0.003546=gms. of Cl
Grams of Cl per cc x 1.509x133.5=oz. NH_4 Cl per gal. of nickel solution.
1.509 is obtained by dividing .00535 by .003546
.71 represents the result of .003546x1.509x133.5

CHLORINE CALCULATED AS NA CL

Number of cc of N/10 Ag NO_3 used x .78=oz. of Na Cl, per gal.
.78 represents the result of .003546x1.649x133.5
1.649 is obtained by dividing .00585 by .003546

Sulphuric Acid N/10 H_2SO_4

Take 3 cc of H_2SO_4 C.P. Sp.g. 1.840 and in a litre flask dilute to 1000 cc.

Sodium Carbonate Na_2CO_3 C.P. Anhydrous

The best method of preparing sodium carbonate for standardizing sulphuric acid is to half fill a platinum basin with pure sodium bicarbonate in powder ($NaHCO_3$). Place it in an air bath already heated to about 200° C., and raise the temperature to 270-80°, but not more than 300° C. Let it remain at this temperature for half an hour, then cool it in an dessicator, and before it is quite cold transfer it to a warm, dry stoppered tube or bottle, out of which, when cold, it may be weighed rapidly as wanted. The carbonate so produced will be from lumps and easily soluble in cold, distilled water.

Standardizing Sulphuric Acid

Weigh out 0.053 gms. Na_2CO_3 and dissolve in 50 cc of water. Add 2 or 3 drops of methyl orange and titrate with the H_2SO_4 until a pink end point remains. If the H_2SO_4 was exactly an N/10 solution then exactly 10 cc of the H_2SO_4 would have been used.

Example: 9.8 cc of H_2SO_4 used
10 cc—9.8 cc=0.2
∴This H_2SO_4 solution requires the addition of
0.2 cc of water for each 10 cc of solution.
To correct the litre of solution
1000 cc=9.8 cc used=990.2

9.8:990.2::0.2:X
X=20.2
∴20.2 cc of water should be added to the H_2SO_4 solution to make it exactly an N/10 solution.

DETERMINATION OF THE ALKALINITY OF NICKEL SOLUTIONS CALCULATED AS CC OF AMMONIA SP. G. 0.90 PER GALLON

Take 10 cc of nickel solution, dilute to 100 cc with water, add 4 or 5 drops of indicator (methyl red), and titrate with N/10 H_2SO_4. A light red color denotes the end point.

Calculation:
The number of cc of N/10 H_2SO_4x2.52=cc of NH_4OH per gal. when 10 cc of nickel solution is taken.
This calculation is based upon NH_4OH Sp. g, 0.90=28% NH_3 1 cc N/10 H_2SO_4=0.0017 gms. NH_3
NH_4OH contains 28% of NH_3
1 cc NH_4OH contains 0.0017÷28x100=0.00607 gms. NH_3
NH_4OH c. p. has a Sp. g. of 0.90
1 gm. NH_4OH=0.00607÷90=6.0067 cc NH_4OH—or, 0.0067x378=2.52 cc NH_4OH when 10 cc of nickel solution are taken.

This method is based on the fact that all good working nickel solutions are on the alkaline side to methyl red. If when testing a solution it is found to be on the acid side a convenient method is to add NH_4OH to the plating solution in small quantities until an alkaline reaction is obtained and then titrate for the actual alkalinity. If found to alkaline H_2SO_4 should be added. One cc of C.P. of H_2SO_4 reduces the alkalinity of the solution 2.5cc NH_4OH per gallon.

SYMBOLS

Ag NO_3=Silver Nitrate
$H_2C_4H_2C_2$=Tartaric Acid
Na CN=Sodium Cyanide
KI=Potassium Iodide
$K_2Cr\ O_4$=Potassium Chromate
Cl=Chlorine
Na Cl=Sodium Chloride
NH_4Cl=Ammonium Chloride
NH_3=Ammonia Gas
NH_4OH=Ammonium Hydroxide
Na OH=Sodium Hydroxide
H_2SO_4=Sulphuric Acid
Na_2CO_3=Sodium Carbonate
Na HCO_3=Sodium Bi-Carbonate

This article will be continued in an early issue.—Ed.

Quenching Muntz Metal

Q.—I would be very thankful to you for a little information on the following subject. Does it injure a Muntz metal tube to immerse in a tank of water immediately after removing from the furnace, or would it be better to spray with hose until cold? Would this method injure the structure of the tube or cause the metal to become hard and split?

I am using a 60-40 mixture for iron pipe size made from a sand core casting. It is then rolled in our rolling mill, afterwards cold-drawn and annealed between draws.

A.—S. L. Hoyt, in his book on metallography, illustrates by the use of a table, the mechanical properties obtained in Muntz metal by cooling at different temperatures, by quenching in water, and by cooling in the air. Briefly stated, at a temperature of 850 deg. F., the samples, water-quenched and the samples air-cooled, showed practically no difference in the physical test. At increasing temperatures the water-quenched samples showed, what in shop terms would be "hard and brittle" and the air-cooled showed little change.

This bears out what has long been good shop practice, arrived at by experience and meets the results of scientific research work.

After the pan is pulled from the furnace, it should not be cooled until the "red is out" or not visible in daylight. This will be at around 850 deg. F. when it can be cooled safely, either by immersing or spraying. Often damage is done by annealing at too high a temperature and is attributed to the method of cooling. Immersing would give a more uniform cooling than spraying and should give the best results.—W. J. Pettis.

Nickel and the Metal Industries

Development of the Use of Nickel in the Plating Shop, Brass Foundry and General Industry

Abstracted from a Paper on The Nickel Industry, Read at the Annual General Meeting of the Canadian Institute of Mining and Metallurgy, in Montreal, Canada, March, 1926

By DR. PAUL D. MERICA

Director of Research, International Nickel Company, New York

Forty years ago, at the inception of Canadian nickel mining, the world's consumption of that metal was about 1,000 tons per annum and this was supplied largely from New Caledonia ores refined in France. This nickel was used principally for the production of nickel-silver coinage alloys, and for nickel-plating.

The world's annual production of nickel rose fairly steadily from 1,000 in 1885 to about 48,000 tons in 1916-1917, dropped to 7,500 tons in 1921 and has since steadily risen again to about 40,000 tons in 1925. Perhaps this car best be traced by an analysis of the nickel consumption of the United States where the records are most complete.

TABLE I.—ESTIMATED CONSUMPTION OF NICKEL IN THE U. S.
(short tons)

	Total Consumption in U. S.	Consumption for steel,—armor plate and ordnance	Consumption for steel,—aside from armor plate and ordnance	Consumption for nickel-silver, for coinage and for nickel-plating	Consumption for general purposes
1903	3,300	1,700	300	1,200	100
1913	6,000	3,100	1,000	1,600	300
1925	15,400	500*	7,700	3,500	3,700
In percentages of total consumption in U. S.					
1903		52	9	36	3
1913		52	17	26	5
1925		3	50	23	24

(*estimated maximum).

In 1903, seventeen years after the inception of nickel mining in Canada, the nickel consumed in the United States was either for the long established uses,—nickel-silver, coinage and nickel-plating,—or for the newer and rapidly growing use,—nickel-steel, armor-plate and ordnance. All other commercial applications amounted to but 12 per cent, including the general, non-military and non-naval use of nickel steels. For the former group the consumption in the United States, in 1903, was greater than the world's consumption in 1885. Fifty per cent of the total nickel, however, was used for military and naval purposes.

In the years from 1903 to 1913 the consumption in the United States, as well as elsewhere, increased greatly, with no marked changes in the distribution of its use.

The war came and all energies were concentrated on nickel production. Unquestionably most of it was used for military purposes in one form or another, the entire Canadian product being conserved for the Allies. Then came, in 1918, the end of the war, the depression of 1921, and what was apparently still more disastrous to the nickel market, the Disarmament Conference of 1921, which immediately and effectively removed its principal pillar,—or at least reduced considerably its importance. In 1921 the world consumed only about 7,500 and the United States only about 2,500 tons of nickel. This was a reversion to the tonnage of the late 'nineties.

DEVELOPMENT WORK IN THE INDUSTRY

The end of the war, the reaction of 1921, and the loss of the military and naval nickel tonnage hastened the realization, within the industry, that more active effort must in the future be put into the development and maintenance of the market for nickel if the industry were to become stabilized in the future and less subject to such a catastrophe as that through which it had just gone. The mining, smelting and refining operations for the production of nickel had always been the primary care and interest of the operating nickel companies, but henceforth, in addition, the marketing and distribution of nickel must receive equal attention.

Early in 1922, R. C. Stanley, the new president of The International Nickel Company, instituted a program to give effect to this purpose of developing the market for nickel, and the experience of this company may fairly serve as an illustration of the general trend of activity within the industry. The essential features of this program were two: (1) to develop further the uses of nickel already established and (2) to develop new uses for nickel and additional nickel products when required, particularly for new fields not occupied by nickel. Such an effort had to be and was organized on a broad scale to include active sales and advertising work, as well as research and engineering development.

The majority of products into which nickel goes today are engineering materials. Engineering considerations prevail in the choice of such material for the different commercial applications and engineers decide that choice. Competition is keen, not only in the sale by different producers of the same product but between products of different composition or type for the same purpose.

The need, therefore, for competent research and engineering effort in promoting the industrial use of nickel products was recognized through the organization of a separate department of engineering development and research, in addition to the normal production and sales departments. This department maintains research laboratories and staff, the activities of which are directed toward the development of new uses of nickel and new nickel products. Laboratory investigations of engineering problems attending the use of nickel products, both new and old, are carried on and much of the information and data required for field development and sales work are there secured. The department maintains an engineering staff for the field work, familiar with the different field in which the use of nickel products is being promoted, and with the nickel-bearing materials used in these fields as well as their competitors.

THE PRESENT STATUS OF THE MARKET FOR NICKEL

Since the depression of 1921 the world's production of nickel has again risen from 7,500 to about 40,000 tons. Despite the loss of the former tonnage for military purposes the consumption of nickel in the United States has risen in 1925 to twice its latest pre-war figure. The military demand is today practically negligible and has been replaced by normal industrial requirements. Other

factors, in addition to the development work by the industry itself, have been helpful in bringing about this changed position. The automotive industry has made a truly remarkable advance, the annual production in the United States increasing from 485,000 in 1913 to about 4,300,000 cars and trucks in 1925. Since the average consumption* of nickel per automobile is about two pounds, the automobile production of 1925 used about 30 per cent of the United States nickel consumption in that year. The automobile has in a sense replaced armor-plate and ordnance as an outlet for nickel. However, the automobile is not today the only factor in the improved position of the nickel market; in fact, as will be seen later, there is really no one outstanding factor in that market today—but instead many lesser ones.

In 1903 the consumption consisted practically of four major items alone; viz., plating, nickel-silver, coinage and nickel-steel used principally for military purposes. Today the consumption includes, in addition to Monel metal, eleven major items, given below, of which several are in turn considerably diversified.

Structural nickel-steels.
Nickel-silver.
Coinage and copper-nickel alloys.
Nickel-plaiting.
Heat-resisting alloys.
The Edison storage-batttery.
Malleable nickel.
Ferro-nickel alloys.
Nickel cast-iron.
Nickel cast-brasses and bronzes.
Hydrogenation of oils.

NICKEL PLATING

The art of electroplating with nickel is old, having been discovered by Boettger in 1843. Although the extent of its use has, of course, steadily increased during the last fifty years, I think it is fair to say that the art of nickel-plating has until fairly recently,—remained an art. Only within recent years have we begun to see the development of a science of nickel-plating, based upon more accurate knowledge of the fundamental principles and factors involved in the plating operation. This awakening, within the industry, has certainly been due, in part at least, to the splendid research work on electroplating carried out by the United States Bureau of Standards, and to the careful attention which has been devoted to it by the industry.

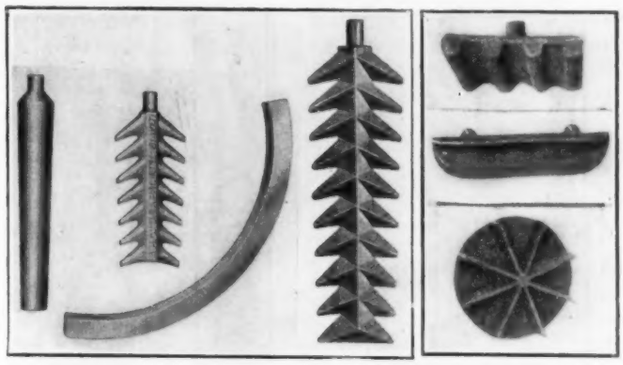
*This, it should be noted, varies widely with different cars.

SOLUTION CONTROL

And, although there remains much of art in successful plating, there is growing appreciation of the necessity for scientific control of plating operations—and improved knowledge of the conditions which should be controlled and to the limits of that control. Thus, the maintenance of the proper hydrogen-ion concentration of a nickel-plating bath is today recognized as an all-important factor in securing successful results, and many plants now actually do control their plating solutions in this manner.

HEAVIER DEPOSITS

Out of the increased technical activity in this field have grown several developments, one of which is naturally of the greatest interest to the nickel industry. That is the present tendency in commercial plating toward the production of heavier nickel deposits.

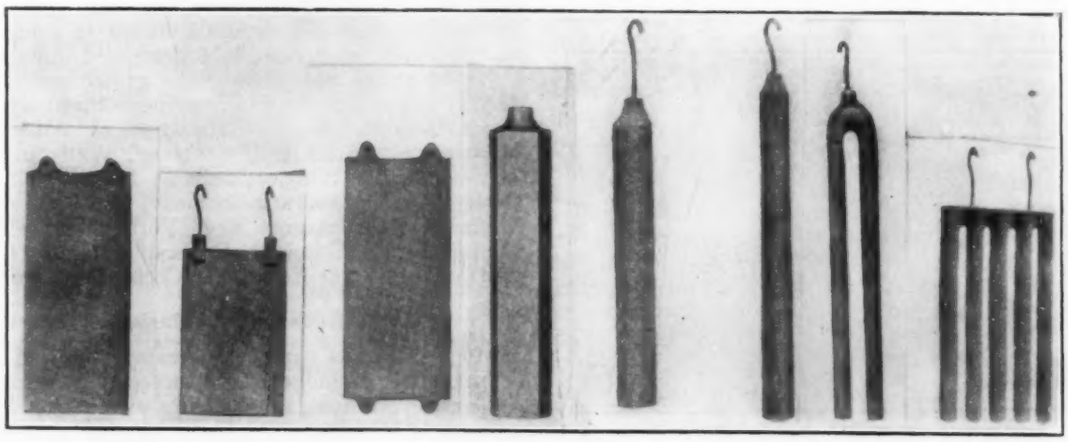


SPECIAL ANODES MADE BY APOTHECARIES HALL COMPANY.

SPECIAL ANODES OF SEYMOUR MFG. CO.

It has been the practice in the past in nickel-plating iron, steel or brass to deposit layers of nickel varying from 0.0002 of an inch down to as little as 0.00005 of an inch. These deposits are somewhat porous, and as nickel is electro-negative to iron the latter readily rusts through any small opening in the nickel coating. In consequence, nickel-plated steel articles, as is only too well-known to us all, are very likely to rust within a short period of time—generally a few weeks or months—when exposed to the weather. Strangely enough we put 0.002 inches of zinc on steel in order to secure adequate corrosion protection by galvanizing but less than one-tenth of this has been thought ample when nickel is used.

About two years ago one company producing nickel-

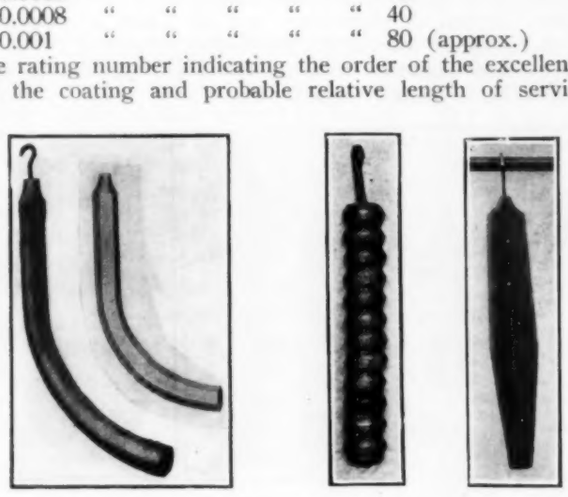


STANDARD ANODES MADE BY ALL CONCERNS. TYPES FROM LEFT TO RIGHT ARE: FLAT 2-EAR; FLAT 2-LUG; FLAT 4-EAR; HEX BAR; OVAL BAR; ROUND BAR; TWO BAR; FIVE BAR.

plated automobile bumpers, after some study of the matter, adopted the rather simple expedient of using a deposit of about 0.001 inches in thickness as a means of securing an article which would be stable in appearance and free from rust over a long period of time, an expedient which had been recommended as early as 1916 by Watts. This company demonstrated that by this method greatly improved resistance to rusting could be obtained, as measured by the standard salt-spray test. Thus in terms of ratings of rust resitance which were made of experimental nickel coating by this test,

0.0001	inches	of	nickel	plate	rated	1
0.0002	"	"	"	"	"	2
0.0008	"	"	"	"	"	40
0.001	"	"	"	"	"	80 (approx.)

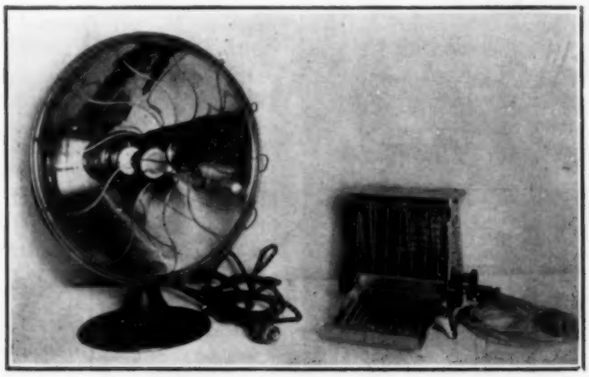
the rating number indicating the order of the excellence of the coating and probable relative length of service



LEFT, BARREL ANODES. CENTER, MUNNING QUOIT ANODE. RIGHT, HARSHAW FULLER & GOODWIN, SPECIAL ANODE.

before rusting. The superiority of the 0.001 inch coating over the 0.0002 inch and other coatings of usual thickness is obvious.

The improvement indicated by these accelerated tests has been borne out in practice and bumpers plated in this manner have been in service from eighteen to twenty-four months without showing any signs of rusting, whereas



NICKEL CHROMIUM HEATING ELEMENTS IN SIMPLEX ELECTRIC HEATER AND HOTPOINT TOASTER

with the thinner coating previously applied it was not uncommon for these bumpers to rust within a few weeks.

What about the cost of heavier plating? It is fortunate that, by reason of our recently improved knowledge of nickel-plating, it is today possible to put down heavier coatings of nickel at but a slight increase of cost, if any, and this is due to the improvement in our knowledge of plating. It is this fact which effectively sustains the popularity of heavy nickel-plating in service. It costs no more.

By employing thorough and intelligent control of all plating operations and by the use of proper materials, it is possible to use much higher current densities (from 30 to 50 amperes per square foot). It is, in consequence, practicable to maintain the labor cost of the plating operation

NICKEL PLATED BUMPERS
MADE BY C. G. SPRING & BUMPER CO., DETROIT, MICH.

practically the same,—and this is a major item of expense. On the other hand certain definite economies are secured through this practice, particularly in the most expensive department,—the buffing and finishing one. The surface imperfections of the base metal are smoothed out in the heavier coatings and necessitate less buffing. In addition the efficiency of the buffing operation can be much increased since a heavier buffing pressure can be used, without danger of burning the plating and hence the time of buffing further reduced. At one plant the number of articles buffed per day per man has been increased thereby from 40 to 1000.

The success of this practice has been so definite that it is rapidly becoming more general. The automobile trade is very exacting in its demands upon wood or metal finishes of all sorts. It has been quick to recognize the value of durable nickel-plated finishes and is today demanding this improvement. It is not alone, however. Heavy nickel-plating is also being practiced in the general hardware trade, in the finishing of electric appliances and in electrotyping. It is safe to predict that in the very near future the majority of nickel-plated articles,—at least of the better class,—will have coatings of nickel really thick enough to provide adequate rust protection and varying from 0.0005 to 0.001 inches in thickness, and that superior coatings will be demanded quite generally.

Nickel anode manufacture has grown considerably in recent years; among the prominent manufacturers are the following: Anode Corporation of America, New York; Apothecaries Hall Company, Waterbury, Conn.; Hanson & Van Winkle Company, Newark, N. J.; Harshaw, Fuller & Goodwin Company, Cleveland, O.; A. P. Munning & Company, New York-Chicago; Seymour Manufacturing Company, Seymour, Conn.; U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

MONEL METAL AND MALLEABLE NICKEL

Monel Metal is twenty-one years old and if one may be permitted to judge of its success by the number of similar compositions subsequently placed on the market, it must be considered to have achieved definite recognition. Certainly it has now taken its place as a necessary enginneering material for applications requiring an alloy resistant to corrosion.

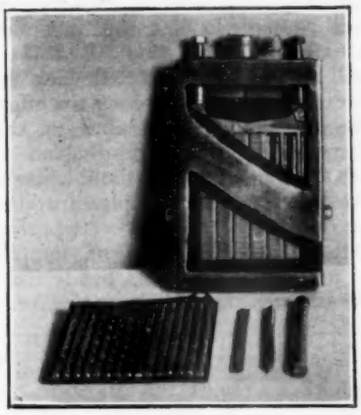
Where is the increased production of Monel Metal going today? It is going not into one but into many industrial fields. Perhaps the most important recent development has been that of its use in what may be called the semi-chemical fields, those in which its corrosion-resistance, its appearance and the appearance of the products handled in it are of primary importance.

Thus it has become almost standard in the construction

of laundry machines, replacing wood, brass and galvanized iron because it can be more readily cleaned and kept clean, and does not spot or discolor the clothing. It is largely replacing wood in dyeing machines for practically the same reasons. Widespread is the use of Monel Metal in the food preparation and handling industries,—in the packing houses and particularly in hotel and restaurant kitchens and in cafeterias, where it is used both for food-containers and for furniture trim, table-tops, cabinets, sinks and other appliances. In the similar field of hospital utensils Monel Metal is also rapidly gaining favor. One of the most recent developments is its use in soda fountains for ice cream cabinets and for domestic refrigerating machines.

The use of malleable nickel is also increasing. Perhaps the most recent and promising application of malleable nickel is in the dairy field for the construction of various types of milk handling and treating machinery, such as pasteurizers and milk cans, replacing tinned-copper principally. The chief value of nickel in milk handling is its appearance and the ease of its cleaning coupled with the fact that it is very little affected or corroded by milk products, and what is perhaps most important it does not impart any perceptible taste to them.

The seamless nickel tube.—Within recent months it has been possible to announce the commercial production of seamless nickel tubes in commerical sizes. Although they were produced experimentally several years ago, by one company at least, it has required considerable time to develop production to the point at which it was commercial and to insure a reliable source of supply. These tubes are made by hot-piercing a hot-rolled billet of nickel followed by hot-rolling on a mandrel and, in the case of thin-wall tubing by cold-drawing to size. They are used chiefly, up to the present, in dairy equipment.



EDISON IRON-NICKEL ALKALINE CELL.

HEAT RESISTANT ALLOYS

It is customary to refer rather loosely to a group of alloys consisting chiefly of nickel, chromium and iron as "heat resistant" or "electrical" alloys for the reason that they do not oxidize or scale readily at high temperature—1200 to 2200° F. They have excellent mechanical properties and strength at these temperatures in comparison with steel or other structural materials, and have as well, high electrical resistance and low temperature coefficients thereof.

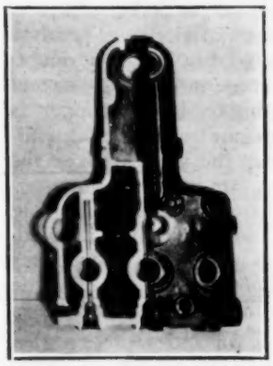
Several compositions of alloys are produced under a variety of trade names, but they conform roughly to the following type of compositions:

NICKEL	CHROMIUM	IRON
balance	20 per cent	
65 per cent	13 " "	balance
35 " "	15 " "	balance
5 " "	25 " "	balance

One of the newest applications is in the field of electrical communication. The Western Electric Company recently developed an alloy containing about 78.5 per cent nickel, the balance iron, which they have called Permalloy, and which is distinguished by its remarkable magnetic permeability at low intensities of the magnetic field.

NICKEL IN THE BRASS FOUNDRY

The use of nickel in brass and bronze castings is, of course, one of the oldest applications of nickel, if we regard German or nickel-silver and Chinese white copper as nickel-bearing brass. This use of nickel appears to have been a fairly stable one throughout the centuries and is even today increasing. Ornamental hardware is now the outlet for these alloys as it was one-thousand years ago through automobile hardware, door handles and hinges, wind-shield frames, typewriter parts, saxophones and other musical instruments have taken the place of the swords, lamps and coinage of the early Chinese industry. One of the fields in which there is promise of increased use of these alloys is that of domestic plumbing fixtures, although rapid development of this field is just now waiting somewhat on technical improvement of the art of making pressure castings of them.



NICKEL BRONZE LOCOMOTIVE LUBRICATOR, MADE BY DETROIT LUBRICATOR COMPANY.

Some years ago the use of small amounts of nickel in leaded bearing-bronzes was developed by G. H. Clamer, the function of the nickel being to restrain the segregation of the lead. The well-known Ajax plastic bronze was perhaps the earliest commercial bearing-bronze of this type using nickel.

More recently it has been discovered that a small amount of nickel in pressure-bronzes of certain common compositions aids considerably in improving the density and water-tightness of castings made from them, and many foundries are today utilizing nickel for this purpose. One foundry manufacturing a complicated locomotive lubricator casting with an alloy containing,

Copper	balance	Lead	5 per cent
Zinc	7 per cent	Tin	2.5 per cent

has found in practice that its casting loss by reason of rejection for leakage under pressure and other defects has been cut in half by the addition of from ¾ to 1 per cent of nickel. This nickel, it may be said, is effectively added in the form of a low-melting point intermediate alloy containing approximately equal parts of copper, tin and nickel.

For steam valves operating at intermediate pressures and temperatures, also, addition of nickel has proved beneficial and is being practiced. Not only are the castings denser and more solid, but they are of finer grain structure and partly in consequence of this, stronger and harder at the higher operating temperatures. One such composition, used by a prominent valve manufacturing company, contains,

Copper	82 per cent	Zinc	4 per cent
Tin	10 per cent	Nickel	3.5 per cent

this is used for valves to operate at 400° F.

EXHAUSTION OF NICKEL MINES

The question may well be asked, what will be the effect in the future of the present nickel market developments. Will the Canadian ores soon be exhausted? Fortunately there is no cause for worry in this respect. The ores now in sight will take care of the world's requirements at the present rate of consumption for at least a century, and additional reserves will undoubtedly be located as these are developed and used.

Drop Forging Metals

A Description of British Practice. Conclusion. Copper and Brass*

By DROP FORGER

COPPER

Copper is a metal which is being stamped today in greatly increasing quantity, the stampings being mostly used for electrical work. There is no particular difficulty attached to copper stamping. In some circles it is advocated that such stamping be done cold, but it is very doubtful if there is any particular advantage in doing so, except in the case of very small stampings. If the copper is properly annealed, small stampings can be made cold without much danger of splitting either the stampings or the died. Copper in the cold worked condition is, however, not ideal for many purposes, which means that such cold worked stampings have to be subsequently annealed. Moreover, if much deformation is necessary, the copper will require one or more intermediate annealings. On the whole, therefore, it is clear that cold stamping has little to recommend it.

Hot stamping of this metal is advantageous in many ways. When hot, the metal will flow into the dies much more easily than it does when cold, even if it is thoroughly annealed. A further advantage of hot stamping is that it obviates the necessity for intermediate annealings, which are essential for cold stamping. Again, there is generally no need for a final annealing of hot stamped copper stampings, as the heat which remains in them at the conclusion of the operation is generally quite sufficient to effect the amount of annealing which is required for commercial work.

MACHINING CONSIDERATIONS

It is to be remembered that copper stampings have generally to be machined, and dead soft copper is not an easy metal to machine with the production of a good smooth surface. If the metal is dead soft it tends to tear, when machining, rather than cut crisply. In these cases it is sometimes found to be advantageous to hot stamp until nearly down to finished size, and then finish with a few blows with the metal cold, or nearly so. With complicated designs, there may be some trouble in following this method, owing to the contraction of the metal on cooling. Sometimes a more simple method can be followed. This consists of using copper which contains a small proportion of a hardening element such as arsenic and iron, but, again, it often happens that the use of such metals is precluded owing to the specification demanding the use of pure copper, and, of course, it is true that the presence of small amounts of foreign matter in copper frequently affects its electrical conductivity to an enormous extent.

TEMPERATURE AND TEMPERATURE CONTROL

The correct stamping temperature for copper is between 650 and 700 deg. Cent., and this range also constitutes the annealing range of temperature for this metal. As this temperature is a low one, and is just a dark red colour it follows that the use of a pyrometer is to be strongly advocated. It is, of course, possible to produce copper stampings without pyrometric control, and, indeed, this practice is often followed; but it is not possible to get perfect results by such doubtful methods.

If the temperature falls only slightly below the stated limits, little damage will result as only a little cold work will be incurred, but if the temperature falls considerably then the cold working is liable to be excessive with the possibility of splitting. If, on the other hand, the metal becomes too hot, which is the more likely happening, then there is grave probability of a number of faulty stampings being made. It is a simple matter even to melt copper in the ordinary stamping furnaces, and if this takes place only on the edge of the metal, it is frequently not noticed by the stamper, and the net result is a spoiled stamping.

DESIGN AND LUBRICATION OF DIES

So far as provision for expansion and draw are concerned, there is no need to make special provision for this metal. As there is no scale formed, such stampings may well be made in dies which have been sunk for steel. The actual impression should be as smooth as possible, which will allow of the metal flowing more freely into the impression. It will also have the effect of reducing the necessity for the use of a lubricant, which latter can often be dispensed with under suitable conditions. It is also of advantage to stamp without using any lubricant, as oil and the like produce an unpleasant black skin, which is not to be desired. It is, however, preferable to use a lubricant rather than run the risk of stampings sticking in the dies. If a stamping becomes firmly fixed in a die, it generally necessitates the die being removed from the hammer and putting on one side to cool, when the contraction, coupled with vigorous handling, usually accomplishes the desired removal.

If oil is used and the resulting black skin is required to be removed, it is necessary to pickle the stampings. This can be done with numerous pickling baths, but probably the best is one composed of a solution of potassium bichromate in water, to which is added a little sulphuric acid. When the bath is used hot, the requisite time for completion of the pickling is very much reduced. The heating is cheaply and conveniently performed by leading hot waste steam into the bath.

TABLE I.—SOME HOT-WORKING BRASSES AND THEIR PROPERTIES AFTER CORRECT WORKING

Approximate Composition Per Cent.							Minimum Mechanical Test Figures.		
Copper	Zinc	Iron	Aluminium	Manganese	Tin	Lead	Yield Point Tons per square inch	Maximum Stress Tons per square inch	Elongation % on 2 in.
58	40	—	—	—	—	2	—	20	25
60	40	—	—	—	—	—	10	25	30
58	40	0.5	0.5	Nil.	0.5	0.5	13	28	28
58	37.5	1	2	1.5	Nil.	Nil.	16	30	18
57.5	37	1	3	1.5	Nil.	Nil.	18	35	16

* Parts 1 and 2 were published in our issues for April and May, 1926.

FURNACE

The type of furnace used for copper stamping is a matter of importance. The ordinary and commonly used coke furnace as used for steel should not, under any circumstances, be used. It is common practice for such furnaces to consist of simply a hearth containing coke, the air being blown in by blast. Whilst such furnaces are to some extent sufficient for steel stamping, they cannot be controlled sufficiently accurately for copper. Moreover, the sulphur in the coke is liable to be absorbed to some extent by the copper, which is detrimental. The best type of furnace is probably a gas furnace, but as coal gas is expensive in some areas, oil fuel can often be arranged suitably for this class of work. In every case it is essential that the actual flame be taken over the top of the metal, since if it comes into actual contact with the metal severe damage due to several causes is liable to be the result. The metal may either become spongy at its edges, or it may absorb undesirable gases. Both an oxidising and a reducing atmosphere in the furnace may have a deleterious effect on this metal, and so it is good practice to arrange for the time of heating to be as short as possible. The heat conductivity of copper being very good, this matter can be easily arranged.

To avoid the metal coming in contact with the actual flame in the furnace, it is a good plan to cover the metal with a sheet of scrap steel in addition to ensuring that the design and flues are such as will draw the flame away from the metal. To do this effectively, it is better to employ a furnace with a higher roof than is commonly used in steel stamping practice.

BRASS

Somewhat similar remarks to the above apply to the drop stamping of brasses. Perhaps it will be well to say at once that it is probable that the greatest trouble experienced with the making of drop forgings in these alloys is due not so much to faults in the process as to the using of unsuitable material. As a guide, some of the alloys most generally used for this purpose, together with the mechanical properties obtainable after correct working, are given in Table I. It is rare that alloys other than those given are used for this purpose.

TEMPERATURE OF FORGINGS

For the majority of stampings, extruded bar is used as stock material. This stock is convenient to use, and can be manipulated in much the same way as is rolled steel bar. It can either be cut into convenient lengths, or alternatively it can be used in lengths by forging off the bar, as it is called. Owing to the good heat conductivity of these alloys and to the delicate temperature control which is necessary, it is always preferable to use cut pieces. This means that a small extra cost is incurred due to the cutting, but, on the whole, this expenditure is well worth while.

Here, again, as with all non-ferrous drop forgings, the most important factor which determines the success or failure of the operation is the temperature at which stamping is performed. For the straight 60-40 type of alloy a large range of temperature is permissible, ranging between 650 and 800 deg. Cent., but it is better to endeavor to work within 670 and 750 deg. Cent. With the higher tensile alloys, it is advisable to endeavor to keep within the range of 650 and 700 deg. Cent. The golden rule is to work these alloys at the lowest convenient temperature. This is not quite easy as it would appear to be, but the object of so doing is to keep the grain size of the alloys as small as possible without running the risk of splitting the stampings by cold working.

The mechanical properties of all these alloys depends almost entirely upon their grain size. If the temperature to which they are heated is high, the grain will grow enormously, and it is not uncommon for individual crystals of approximately the size of a pea to be formed if the temperature to which the alloys have been heated is high. In these cases it is nearly possible to break up the alloys in one's fingers.

It is also important to bear in mind that the size of the grain cannot be reduced by subsequent heat treatment, as can so conveniently be done with steel stampings. Once the grain has grown to this enormous size, it is impossible to reduce it again except by means of working. But working is generally impossible, as the alloy usually tends to fall to pieces on forging. The best things to do under the circumstances is to scrap and remelt the alloy.

TEMPERATURE CONTROL AND FURNACE

From the above it will be appreciated that once again pyrometric control is in every way desirable. Furthermore, it must not be thought that the presence of a pyrometer insures one against the possibility of over-heating. A pyrometer rod only registers the temperature at its end, consequently a carefully-trained eye is essential to see that no part of the furnace or material is hotter than the end of the pyrometer rod.

A gas-fired furnace is probably the best for this purpose. Coal and coke hearths should not be used; but if one of these fuels only is available, then the heat must be so arranged that it passes over the top of the alloy. If the actual flame is allowed to come in contact with the alloy, the result is almost certain to be that the alloy will become overheated in parts, with consequent destruction.

DIES AND LUBRICATION

There are no further special precautions which need be observed with these alloys and which has not been mentioned in connection with the non-ferrous alloys already discussed. The allowances for draw and contraction may be much the same as for steel. This is due to the fact that whilst the coefficient of expansion of these alloys is different from that of steel the lower temperatures employed compensate for that. In any case, different stampers have their own opinions as to the amounts which should be made for both contraction and draw. It is very unusual for long and thin section brass stampings to be made, which fact renders the consideration of contraction allowances of little importance.

If the dies are carefully finished, simple designs of stampings in these alloys can be successfully stamped without using any lubricant. If there is found to be any distinct tendency for the stampings to stick in the dies, a little graphite and water is perhaps the best lubricant which can be used. It must, however, be used very sparingly, as if a quantity of the graphite collects in any one portion of the die, the shape of the stamping is altered. Furthermore, an excess of graphite is liable to produce flaws in the surface of the stamping during drop-forging.

SEASON-CRACKING

Extruded bar rarely contains surface flaws of particular importance. It does, however, contain flaws on occasions. These internal flaws may run throughout a bar, or they may only be present in portions of a bar. To discover their presence prior to stamping, it is a good plan to cut the pieces of material only partly through, when, if the remainder be broken off so as to exhibit the fracture, the presence of internal flaws is at once revealed.

All non-ferrous alloys of the copper-zinc variety are liable to suffer to some extent from season-cracking. This is made evident after working either hot or cold. To lessen this evil, anneal all stampings in these alloys at a temperature of between 650 and 700 deg. Cent.

Brass Foundry Pointers

Methods of Producing Alloy Castings

Written for The Metal Industry by WILLIAM J. REARDON, Foundry Editor

DIPPING BRASS CASTINGS

Q.—We are looking for an inexpensive cleaner to improve the appearance of water tumbled brass castings. What can you suggest?

A.—We are afraid that if you want to produce a better finish on your brass castings, you will have to resort to acid dipping. You might try about 2 oz. of washing soda per gallon of water in the tumbling barrel.

If that will not give you the desired results, prepare a bright dip of acid as follows:

Aqua Fortis, 38 per cent	1 Gal.
Sulphuric Acid, 66 per cent	1 Gal.
Water	1 Quart
Muriatic Acid	2 oz.

After mixing let the acid stand for some time to cool. Then dip your castings in this mixture and rewash in running water, then rinse in boiling water to aid in drying and prevent water stain. Add half an ounce of whale oil soap to each gallon of boiling water.

CORE MIXTURES

Q.—I wish to know of a mixture for making the very best foundry cores, strong, but porous.

A.—You do not state if you desire core sand mixtures for brass, steel, iron or aluminum castings.

A satisfactory core mixture for brass:

Molding sand	1 part
Beach and silica sand	20 "
Core oil	1 "

Steel core mixture:

20 shovels	new sand
40 shovels	old sand
3 shovels	Fire Clay
18 shovels	sawdust

Temper with molasses, water 1 to 6 parts. Aluminum jackets core:

8.5 Gal. buckets of Sharp sand.
5.5 Gal. buckets of Silica sand.
3 Qt. glutrine.
4 Qt. pitch or rosin.

In a general way all core sand mixtures are based on the locality. Hence a little trying of mixture to suit the sand in your locality is desirable. But good strong open cores for all purposes can be made with sharp and silica sand: 1 part good core oil; 20 to 60 parts sand, according to the grade of oil and strength of sand desired.

CASTING BABBITT

Q.—How can we avoid blowholes or air holes in alloys poured into a cast iron form, making a coating or layer of it ⅜" thick on a piece of tinned steel shafting 2½" in diameter by 14" long? We will use other lengths also, 12½", 10½" and 6½", each having 1¼" diameter steel for bearings and gears at each end.

We have been pouring the alloy about ½" to ⅝" thick, but find on turning down on lathe to ⅜" thick that blowholes are still found. These must all be eliminated for job in hand.

We use alloy of about 50 lead —50 tin with a very little antimony and tin base metal and Liberty Motor babbitt.

Everything is prepared for ready pouring, the form and shaft heated by placing directly on top of a coal heating stove until pouring time. The cylindrical form is turned inside and made of two halves bolted together with small air vents along the length. Pouring has been tried with form horizontal and vertical. Alloy metal is heated until it browns or ignites a pine stick. The higher temperature does best. We have, however, not succeeded in pouring a single one without at least several blowholes down through the cylinder.

A.—We are of the opinion that your trouble is due to not enough metal around the shaft. We suggest that you increase the thickness of metal from ½" to ¾". If this will not remedy your trouble, increase it to 1", or have a flow over on the mold so that the first metal in the mold will flow over and out until all air has passed out of the mold and will assure you solid metal.

POURING NICKEL SILVER

Q.—Would appreciate any suggestions you may be able to offer as to the correct pouring temperature for a nickel silver alloy, containing approximately 58 copper, 18 nickel, 22 zinc.

We pour light castings, are troubled with misruns, and are considering the use of a pyrometer, but have no data to give instrument makers.

A.—The pouring temperature of a nickel silver alloy is about 2,500° F. and to attain this temperature the furnace should work rather quickly. The best method of obtaining this temperature is to use oil or gas as a fuel.

As you state your trouble is misruns, we would suggest that you add ¼% of aluminum to your mixture and you will find it will help materially to reduce your loss from misruns; granting your molding and gating are properly arranged. First your molding sand must be as dry as is good practice to work. Skin drying the mold will also help to reduce losses.

ALUMINUM IN BRASS

Q.—I am sending you a small sample brass casting. Can you account for the rotten metal at the gate? We are melting hand-picked scrap in oil fired crucible furnaces. Melting conditions appear O.K. We use phosphor copper stirred in just before pouring. The metal looks clean and bright in the crucible, but we have a heavy loss from dirty castings.

A.—On examining the sample we are of the opinion that your metal contains some aluminum and we suggest you eliminate the phosphor copper, as phosphorous is very detrimental where aluminum is present. We suggest you add to the scrap brass 5% of zinc, and 3% lead, and do not pour too hot. We feel your trouble is due to the small amount of aluminum in your scrap brass and if you leave out the phosphorous you will not have any further trouble, providing your sand is not too fine. At the same time use an opener grade of molding sand, similar to No. 2 Albany sand, for this class of work, as too fine a grade will scab.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers

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Contents

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EDITORIAL

ELECTRO-PLATERS' CONVENTION

The fourteenth annual convention of the American Electro-Platers' Society will be held in Newark, N. J., June 28-July 1 inclusive. This convention bids fair to be one of the most interesting, best attended and in many other ways, most important ever held by the Society.

Aside from the unusually fine program, a number of problems may be settled by the Society at this meeting. They have been discussed many times and opinion is now fairly crystallized so that definite action can be taken.

In the first place, assistant foremen platers should be admitted to membership, at least as juniors. An article by Mr. Proctor on page 232 of this issue, a letter published in our correspondence columns and the answer by Mr. Proctor on page 248 prove the case of the assistant foreman so conclusively as to need no further argument.

Another forward step should be taken by releasing papers for publication in the technical press within a reasonable length of time after the meeting. Reasons for this step have also been given so many times in these columns that they need no further discussion.

The most important project before the Society at the present time is, of course, the Research Fund. This cannot be settled at the meeting, but enough spirit should be worked up so that the members will work doubly hard in soliciting contributions from their employers. THE METAL INDUSTRY is heart and soul with the Society in this campaign and we not only urge industrial firms to contribute but have proved our faith in this project by ourselves contributing to the Fund.

The value of the American Electro-Platers' Society in industry is no longer problematical. The standards of the industry have been raised beyond anything dreamed of ten years ago. Schools and classes have been established, like the Essex County Vocational School course in analysis of plating solutions, in conjunction with the local branches. Great strides have been made with the aid of the Bureau of Standards and the Research Committee of the Society. All that remains is to acquaint manufacturers with the work of the Society and to show them that it is to their financial interest to co-operate with it. Every electroplater in the United States should attend this convention. It will have not only great technical and educational significance, but it will be a re-union of the pioneers who were instrumental in forming and building up the Society, some of whom attended the very first meeting.

All roads lead to Newark.

AMERICAN PROSPERITY

A new book has been published, entitled "The Secret of High Wages," written by two young Englishmen, B. Austin and W. Francis Lloyd, who based their findings on a tour of the United States and interviews with leading American magnates. They account for our "astounding prosperity" by the following reasons.

1. Promotion in America is by merit.
2. America sticks to the principle of small profits and quick returns, and wealth is made by fine margins of profit on immense and rapid turnover.
3. Rapid turnover is secured by simplification and cheapening of processes which necessitates less capital for a given output.
4. America shows endless keenness in devising time-saving and trouble-saving appliances.
5. The American employer is not hostile to high wages.
6. American manufacturers co-operate by exchanging ideas.
7. Americans are vigilant and acute in eliminating waste and in conserving time, energy and space.
8. American welfare methods double high wages in their stimulative effect by surrounding the workers with cleanliness and light and by seeking in every way to increase their conveniences and satisfaction.
9. Americans encourage research with magnificent intelligence, scouring the world to obtain the best research brains.

These conclusions are too interesting to pass by unnoticed. Reasons 1 to 4 inclusive are probably true on the whole, allowing of course, for a normal percentage of error and exceptions to rules. With regard to reason 5, it must be stated that this varies in different sections of the country. Probably, however, American wages, even at their lowest, seem high to Englishmen. Nevertheless, it must be admitted that the knowledge is spreading in this country that wages are not only a cost item, but also a source of revenue, in that they provide the purchasing power which absorbs our enormous output of manufactured materials. The old order is changing, perhaps rapidly, and the employer figures his labor costs not in total number of dollars, but in dollars per unit of output. In other words, he is willing to pay high wages for high production.

Item 6, we wish were more generally true. Of course, there are hundreds of trade associations and technical societies working toward the end of further interchange of ideas, experience and facts but the perfect condition is still far off.

Item 7 as regards waste, we must take the liberty to doubt. The United States has long been known as one of the most wasteful of nations, both with its raw material and its by-products. Even a casual reading of the book Waste in Industry will enlighten the over-optimistic, and we doubt very much if the country has reformed completely in the past few years. Item 8 is true of some of the best and largest companies, but can hardly be called generally true.

Reason 9, stating that Americans encourage research with magnificent intelligence causes us only to wonder where the authors have obtained their information. A few outstanding examples can be cited of powerful, broad-minded corporations who have seen the value of research and actually made it pay. The General Electric Company, the Eastman Kodak Company, Anaconda Copper Mining Company, the Western Electric Company, and others can be cited as examples. On the other hand, we have the outstanding example of one of the most powerful of the chemical companies, which only a year or two ago absolutely abolished its research department, and the added example of many other corporations who will not even

consider research. We do not mean to be pessimistic and we do know that the respect for research and the belief in its ultimate value, is growing—but not very fast. The young observers should have conferred with some of our leading universities and other research institutions before jumping so light-heartedly at their last conclusion.

Thanks are of course, due to these two young men, who have seen us through rose-colored glasses, for their willingness to see the good points of foreigners, a quality noted for its absence in a large number of our visitors. Moreover, they have pointed out, delicately, the ideals to which American manufacturers should work and probably are working. The fact that these ideals have not yet been entirely attained is no disgrace, but there should be no relaxation of effort. Perfection is still ahead of us.

NAMES FOR ALLOYS

One of the most irritating questions, just as irritating to-day as it has ever been, is the question of alloy nomenclature, and it shows few, if any, signs of improvement. To a great extent this is caused by the complexity forced upon the industry by the fact that there is almost no limit to the number of metals that can be compounded into an alloy. By permutations and combinations the number of possible alloys will reach well into the millions. Actual alloys on the market and obtainable do reach into many hundreds. How can we name them all simply and properly?

The fact of the matter is that we do not. Most alloys are at present named, not for their constituents, but for their inventor with some name which seems attractive to those who are interested in it. Such names vary from the meaningless to the misleading, but at best they are a nuisance.

Like most trade abuses, this condition cannot be traced to any individuals nor can it be blamed upon them. It is a condition which came about because of the absence of unified control, and this unified control was an impossible thing to expect in such a trade. In other words, the situation has just "growed" and it is nobody's fault.

This does not mean, however, that it should be allowed to go on growing, and as a matter of fact, such organizations as the American Society for Testing Materials have taken cognizance of the condition and have taken steps to improve it. It is a long distance however, between a recommendation from a technical society and general acceptance by the trade; witness the term "nickelene" for nickel-silver, formerly German silver. As a matter of fact "nickelene" itself is not perfect and "nickel-brass" would be much more accurate. What to do with alloys which contain four or five constituents is still another matter and the task looms up in enormous proportions.

One thing however, can be done and done well, and that is the standardization of the names of raw materials. There is no reason why zinc should be spelter, and eventually we have no doubt that it will cease to be spelter, but it will simply be zinc. Nor is there any excuse for the word galvanized. S. S. Tuthill, secretary of the American Zinc Institute proposes "zinc coated" for "galvanized," but we suggest that even this can be improved upon by the term "plated" instead of "coated," in the interests of consistency. We have tin plate, copper plate, and silver plate. Why not zinc plate? Probably lead would also come under this category if much of it were used in flat sheets.

The job is perhaps too large and varied to tackle all at once, but these basic names can and should be clarified and settled once and for all. With this as a foundation, further improvements can be made with less difficulty, if steady and unremitting effort is applied.

METALS AT THE FOREFRONT

It seems that almost every new advance in scientific methods and equipment depends upon the use of metals. The sensational flight to the north pole by Lieut. Byrd, U. S. N., was made in an airplane of which Duralumin, an aluminum alloy was a most important structural material. Without it the plane would have been impossible to handle for such a flight.

The similar, though longer, trip of the airship Norge was made possible by the lightness and strength of the Duralumin framework. It is perhaps too much to say that aluminum was responsible for these extraordinary conquests but it is not too much to say that without nonferrous metals, corrosion resisting, light, strong and workable, aircraft would never have been where it is to-day.

The latest development in marine engineering, the rotor ship, will be also partially dependent upon aluminum. A communication from the designer of that ship, Anton Flettner, states that in the future all of the rotors will be made of thin aluminum sheets, with the exception of some very cheap and rough constructions such as might be used in barges. They will use a new aluminum alloy similar to Duralumin but considerably cheaper. Aside from the rotors and pivots, other metal parts on the vessels will be the same as are generally used in marine work; which means large quantities of brass and bronze.

This is the Age of Alloys, with metals in the van.

WASTING METALS

The waste metal trade is a large one, but we often wonder if the wasted metal activities are not even larger. Reading the reports of the discoveries made by Howard Carter in Egypt in the tomb of Tut-Ankh-Amen, one is struck by the vast quantities of valuable, useful and beautiful objects—buried underground. The excuse that this practice produced art is hardly valid since this art could just as easily have been applied above ground and left there.

It may be said that these things happened thousands of years ago, and that we have outgrown them. But a glance in any funeral parlor and a view of the bronze and silver, and possibly gold, caskets will soon correct that impression. Metals are useful and valuable objects, and it is no desecration to the dead to say that metals can be employed much more effectively and helpfully above ground than underground.

GOVERNMENT PUBLICATIONS

Output of Primary Lead and Lead Pigments in 1925. Department of Commerce, Washington, D. C.

Mine Production of Crude Platinum in 1925. Department of Commerce, Washington, D. C.

Antimony in 1924. By Frank C. Schrader. 5 cents. Department of Commerce, Washington, D. C.

Secondary Metals in 1924. By J. P. Dunlop. 5 cents. Department of Commerce, Washington, D. C.

Lead in 1924. By C. E. Siebenthal and A. Stoll. 5 cents. Department of Commerce, Washington, D. C.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

ADMIT ASSISTANT FOREMEN PLATERS

To the Editor of THE METAL INDUSTRY:

I am an assistant foreman plater. Am I eligible for membership to the A. E. S? I have been given to understand that I am not; that only those with one year's experience as foreman platers are entitled to membership. This seems a little unfair to me, especially as we of the younger generation of platers will be the men to carry on after the plater of today quits, and I think we should be given every assistance. We want to carry on where he left off, not beginning again where he began, which would be running in circles, getting no place, never at any time attaining Mr. Mesle's publicly stated ideal, the Improvement of the Art of Electro-Plating.

B. W. SAGE.

Binghamton, N. Y., April 25, 1926.

To B. W. Sage:

It is unfortunate that the laws of the American Electro-Platers' Society, as they now stand, prevent you from being eligible for membership in the society. If it were possible for me to change this condition I certainly should do so because I can visualize a greater society by accepting assistant foremen who would be true to its precepts and work intelligently for its aims.

This much desired result must come some day if the society is to continue to grow. I have requested THE METAL INDUSTRY to publish your letter as a plea for the assistant foreman plater, for membership in the A. E. S.

CHARLES H. PROCTOR.

New York, May 15, 1926.

HEAT CONDUCTIVITY OF METALS

To the Editor of THE METAL INDUSTRY:

On page 182, of the May issue of METAL INDUSTRY, you have an article on Monel metal and substitutes. The writer is particularly interested in the cupro-nickel alloy consisting of 60 per cent copper, 38 per cent nickel and 2 per cent pure manganese. Is is possible for you to put the writer in touch with the concern that rolls this material in sheets? We would thank you for any information submitted in this matter.

From time to time the writer has noted items on special alloys and materials in your magazine. There is one property of the metals which is usually omitted and in which many industries are vitally interested, our's being one. The item to which we have reference is the heat conductivity of the metal. With the manufacturer of refrigerators and other heat insulating equipment, the kind of metal which enters into the construction of the insulating equipment, has considerable to do with the efficiency of the equipment. For instance, in the manufacture of our all metal vacuum bottles, if we use steel in the neck of the bottle, of the same thickness as a neck made of 30 per cent nickel silver, the bottle made with the steel neck has not as good insulating qualities as the bottle made with the 30 per cent nickel silver neck. Very few concerns who manufacture sheets from steel and other metals, have any information on the heat conductivity of their metals and it seems to the writer that this matter should be brought to the attention of the manufacturers so that they could provide suitable data on the heat conductivity of the metals which they produce.

STANLEY INSULATING COMPANY,
H. M. BADGER, Superintendent.

Great Barrington, Mass., May 11, 1926.

New Books

Transactions of the American Society for Testing Materials, in two volumes. 962 pages and 455 pages. Price, payable in advance, $6 to $8 per volume, depending upon the binding. For sale by THE METAL INDUSTRY.

Part I (962 pp.) contains the annual reports of 35 of the standing committees of the Society, together with the discussion thereon at the annual meeting. They include reports of Committees on Non-Ferrous Metals, Preservative Coatings, Thermometers, Metallography, including a report on Metal Radiography and X-ray Crystallography; Methods of Testing and Nomenclature and Definitions; 83 tentative standards which have either been revised or are published for the first time; annual address of the President and the annual Report of the Executive Committee.

Part II (454 pp.) contains 26 technical papers with discussion. These contain valuable information on results of investigations by experts in the field of engineering materials including the fatigue of metals, the effect of temperature on the properties of metals and investigations on the corrosion of metals.

Psychology in Advertising, by Albert T. Poffenberger. Published by A. W. Shaw Company. 660 pages. Size 5½ x 8⅛ inches. Illustrated. Price, payable in advance, $6. For sale by THE METAL INDUSTRY.

In this comprehensive and authoritative book, the author, an associate professor at Columbia University, New York, takes up the application of psychology to advertising from the point of view of the consumer and regards his human desires and the satisfaction of them as the pivotal points upon which all advertising methods should turn.

The author explains clearly these complex desires and outlines specifically their proper utilization for effective advertising. Step by step, he shows just how human desires can be reached and satisfied by advertising appeals; describes in detail how these desires can be measured, tells what and when each method should be employed; and analyzes in a practical manner the use of the questionnaire for determining the consumer's interests, preferences, prejudices, and brings out just how to tabulate and interepret replies.

The scope and arrangement of this book are partially suggested by some of the chapter headings: The Questionnaire; Attention to Advertising; Attention and Repetition of Advertisements; Attention and Location of an Advertisement; Attention Value of Color and Illustration; Memory of Advertisements; Method of Measuring the Memory Value of Advertisement; Knowledge of Trade Names; Group and Class Difference in Relation to Advertising.

The book is directed to no special trade or industry, but will be valuable to those handling advertising in any line.

The English Brass and Copper Industries to 1800. By Henry Hamilton. Published by Longmans Green & Company. Size 5½ x 8½, 388 pages. Price, payable in advance, $6.00. For sale by THE METAL INDUSTRY.

This book deals with the history of brass and copper industries in England, from their foundation in Elizabeth's time to the end of the eighteenth century. It seems that until the 1500's, no brass was made in England. The establishment of this industry was due to the work of some German capitalists and workmen.

The record of the early struggles of this industry, its transition from concessions to government monopolies and then to free competition, forms an intensely interesting and worth while page in industrial history, especially for us in this country who have inherited what these English and German pioneers built. It is well known, of course, that the brass industry in this country was founded with the aid of English experts and workmen. It took until the early part of the eighteenth century to cover the home markets. After that, exporting began and British brass and copper products appeared in all parts of the world.

Topics of particular interest are are follows: State Encouragement and German Enterprise; Abuse of Legal Monopoly and the Decay of Privileged Companies; Private Enterprise and the Revival of the Industries; Birmingham and the Brass

and Copper Trades; Amalgamation and Combination; Ascendency of Birmingham; Markets and Commercial Organization; Wages and Employment.

No brass and copper man who has anything more than a financial interest in his trade, should be without this book.

Metal Spraying. By F. H. Turner and M. F. Budgen. Published by Charles Griffin & Company. Size 6 x 9, 175 pages. Price, payable in advance, $6.50. For sale by THE METAL INDUSTRY.

The subject of metal spraying has long interested the metal using trades and has been described and commented upon in innumerable references scattered throughout the technical and scientific press. This is, however, so far as we know, one of the most comprehensive works published on this subject.

Metal spraying, while at first a curiosity and trick, has steadily found new fields of usefulness. At first it was thought that its main field would be the covering of non-metallics and other materials difficult to plate, but it has since found wide application in coating tanks and steel structures, etc., because of the rate of speed at which metal can be laid and the ease with which it can be manipulated. In spite of its early hardships, common to every new development, it is unquestionable that metal spraying is here to stay and will grow.

Points of particular interest in the book are as follows: early attempts at metal spraying (including pulverization and the spraying of powdered metals); gas heated and electrically heated wire sprayers; the modern metal spraying apparatus; its operation and efficiency; the nature of sprayed metal; comparisons of metal sprayed process with other methods of metal coverings; applications of metal spraying.

Pyroxylin Enamels and Lacquers. By S. P. Wilson. Published by D. Van Nostrand Company. Size 6 x 9, 213 pages. Price, payable in advance, $3.00. For sale by THE METAL INDUSTRY.

The lacquer industry is one of the remarkable industries of today and its rapid growth seems to be only a forerunner of the development to follow. The automobile industry and the metal novelty field have contributed greatly, but the desire of the consumer for attractive as well as useful articles has been the largest single factor.

The book is particularly timely as it covers, for the first time, in the form of an authentic text book a considerable amount of accurate information just when the demand for such information is very strong.

The book is divided into two parts, the first dealing with raw materials which are as follows: pyroxylin, solvents, non-solvents, plasticisers, gums and rosins, pigments and dyes.

Part two includes bronzing liquids and leather dopes; metal and wood lacquers; lacquer enamels; the application of pyroxylin solutions; miscellaneous analytic methods.

Charts and Graphs. By Karl G. Karsten. Published by Prentice-Hall, Inc. Size 6 x 9, 724 pages. Price, payable in advance, $6.00. For sale by THE METAL INDUSTRY.

Charts are one of the latest development in statistics and because of the fact that they put life into these statistics, they have grown in use to an extraordinary extent, even in business circles which are known to be reluctant to adopt "new-fangled" ideas. In recent years, business men have learned to appreciate the value of statistics, and as a result, the chart, which tells them at a glance what they would have to extract by hard work from tables, has grown very popular.

This book, which by the way, is profusely illustrated, covers the whole subject from every angle; in other words, forms a reference work on charts and graphs. It includes principles, diagrams, classification charts, route charts, and composite charts, under the heading Non-Mathematical. Another section is devoted to pie charts, bar charts, curves, progress charts, summary charts, silhouette charts, etc.

Another section on advanced charts is included more for the statistical expert. Higher mathematics are employed in determining such charts, which incidentally include three dimensional figures.

The book is a very valuable reference work to include in the library of individuals or business firms which have found it necessary to employ charts in condensing and clarifying statistical information.

TECHNICAL PAPERS

An Atomic Picture of Duralumin and Its Crystal Structure. By Robert J. Anderson. Reprinted from the Journal of the Franklin Institute, April, 1926.

Wheel Making Progress. Reprint of an article by Walter C. Gold of Philadelphia, Pa., on Progress in the Manufacture of grinding Wheels. Abrasive Industry, August, 1925.

High-Power Metallography. By Francis F. Lucas. Some Recent Developments in Photomicrography and Their Practical Application to Metallurgical Research. Bell Telephone Laboratories, Inc., New York.

Orientations of Crystals in Electrodeposited Metals. By Richard M. Bozorth. An X-Ray Method of Finding Preferred Orientations of the Crystals in Metal Surfaces. Bell Telephone Laboratories, Inc., New York.

Rapid Detection of Small Amounts of Aluminum in Certain Non-ferrous Materials. By G. E. F. Lundell and H. B. Knowles. Reprinted from Industrial and Engineers Chemistry, Vol. 18, No. 1, page 60, January, 1926.

Possibilities of Chromium and Cadmium Plating in the Packing Industry. By C. H. Humphries, consulting engineer, Vacuum Can Company, Chicago.

The subject was covered in a talk given before the Operating Section of the Institute of American Meat Packers, held in Chicago, October 16, 1925. Mr. Humphries reported the results of comparative tests between specimens of iron plated with cadmium, cadmium and nickel, nickel, zinc (electrolytic, hot dip and sherardizing) and chromium.

Metallic Zinc Powder as a Paint Pigment. By H. A. Nelson and W. A. McKim.

This is a research bulletin of the New Jersey Zinc Company, New York City. The conclusions are as follows:

1. As a rust inhibitive metal primer it is at least equal to any other high grade commercial primer. Ordinary finish coat paints adhere to it and give the maximum of service.

2. It also makes a grey finish paint with a very high hiding power that completely covers any surface in one coat. It holds its color and does not crack upon exposure to the atmosphere.

3. Its peculiar property is that although the surface is hard enough to shed dirt readily, the film maintains its distensibility over long periods of time. This is perhaps due to an anti-oxident effect of the metallic zinc. This property makes zinc dust especially useful in repainting over old paint that is badly cracked and must be firmly held in place.

4. The same properties make it an excellent primer for refractory woods, galvanized iron, sheet zinc and other surfaces that usually cause painting troubles due to poor adherence.

5. The optimum amount of zinc oxide to use with zinc dust for ordinary painting purposes is 10 per cent to 25 per cent by weight of the pigment. For priming iron and steel, about 20 per cent zinc oxide is recommended.

6. Ordinary raw and boiled linseed oil vehicles give excellent results.

7. It is easy to prepare. Zinc dust needs only to be stirred in dry oil or with oil and zinc oxide paste.

8. With ordinary oil vehicles, zinc dust does not "cake" hard in the bottom of the container. Adding zinc oxide keeps it from settling.

9. Hydrogen gas is slowly generated by the reaction between the finely divided metallic zinc in the zinc dust and any free acid in the vehicle. Hence, only oil of low acid number can be used as the vehicle, if the material is to be stored in sealed containers, and acid driers, particularly, must not be used. Zinc dust-zinc oxide pastes made with a minimum of low acid raw linseed oil (about 6-7 per cent) are practically free from this difficulty.

10. Pastes and paints made with zinc dust do not "skin" readily and can be very conveniently stored in containers with air vents, so that for practical purposes the acidity of the vehicle used is not a vital matter.

11. No gas formation has been detected when zinc dust is mixed with typical lacquer enamel vehicles.

12. This paint costs considerably less than red lead paint.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

BLACK ON ALUMINUM

Q.—Can you give me a formula for a black finish on aluminum as the one we have does not stand up any length of time. It does not matter if it is a dull finish as we will lacquer for gloss.

Also is there a good hard lacquer on the market for steel; one that will not mar easily?

A.—The best results are obtained when the aluminum is black nickel-plated to produce a black finish. The surface should then be lacquered to protect it from abrasion and friction. The following formula should give the desired results:

Water	1 gallon
Nickel chloride	6 ozs.
Ammonium chloride	6 ozs.
Sodium chloride	2 ozs.
Rochelle salts	1 oz.
Zinc chloride	¾ oz.

Use hot water in preparing the solution in the order given. Use nickel anodes; voltage ½ to 1. Any of the lacquer manufacturers advertising in THE METAL INDUSTRY should be able to furnish you with a lacquer that will be hard and durable.—C. H. P. Problem 3,530.

BRASS ON IRON

Q.—Would you kindly furnish me with formulæ for brass plating small iron and steel articles in plating barrel. Would like to get plated articles out of solution bright and clear to eliminate sawdust churning after plating; all iron castings given flash of copper before entering brass solution.

A.—The following formula should give you a satisfactory brass deposit on iron and steel that will be bright when the articles come from the mechanical barrel solution. If necessary, for more rapid deposits, the proportions may be increased 25 to 50 per cent.

Water	1 gallon
Sodium cyanide	7½ ozs.
Copper cyanide	4 ozs.
Zinc cyanide	1½ ozs.
Bisulphite of soda	2 ozs.
Aqua ammonia 26°	½ oz.
White arsenic, 1½ grains, dissolved in 5 grains caustic soda; 2 ozs. hot water to be used for solution.	

To prepare the solution use at first, one-third of the total amount of water necessary. First dissolve the sodium copper and zinc cyanides at 140 deg. F., then add the balance of the water cold; then the bisulphate of soda and ammonia and finally the arsenic as outlined. The solution will then be ready for operation at 8 volts. Anodes should be of soft sheet or cast brass, free from lead; 80% copper and 20% zinc produces a satisfactory cast anode alloy.—C. H. P. Problem 3,531.

FINISHING WHITE GOLD

Q.—Received the formula you sent me in January for white gold strip solution. It does not come out as bright as I would like it, for when the white gold and platinum top flexible bracelets come to me from the jeweler they are so black it is very hard to get it off. Could you kindly send me a good formula for the jewelers to boil their work out in after they are through soldering, and could you tell me what to use to make a dull white finish on the bracelets as they do not like them too bright.

A.—The white gold electro stripping solution formula submitted to you was not intended to remove fire scale. If you are using the solution for this purpose, then naturally the results are not as satisfactory so far as a bright finish as would presumably result if the fire scale is first removed. Prepare a pickling solution as follows and operate it at 160-180 deg. 7. It will remove the first scale in a few minutes.

Water	1 gallon
Sulphuric acid	12 ozs.
Bichromate of soda	2 ozs.

To produce a semi-lustre finish you will have to discontinue color buffing. Try using soft buffs, sheepskin or Canton flannel at as low a speed of rotation as possible. For the polishing medium use stearic acid to replace the usual rouge compositions. The bracelets should first be cut down with tripoli to produce a smooth surface. Then cleanse the bracelets and polish to a semi-lustre finish as outlined. The finish should equal the well known Butler or Sheffield silver plate finish.—C. H. P. Problem 3,532.

GOLD CHLORIDE

Q.—What is the best method of making gold chloride? What is good trisalyt? Also fine gold?

A.—Gold trisalyt is a patented combination. It consists essentially of 40 per cent fine gold converted to a cyanide and then incorporated with a sodium cyanide and a sulphite in a chemical combination. The material is greatly used in gold plating. A solution may be prepared with the material in amounts of ¼ oz. per gallon of hot water and upwards. An equal amount of cyanide is usually added to the solution so prepared. Fine gold refers to 24 K. gold.

To prepare gold chloride, dissolve in aqua regia, prepared from 3 parts pure muriatic acid and 2 parts pure nitric acid by measure. The gold to be converted to a chloride should be placed in an earthenware evaporating dish, heated in hot water. The aqua regia should be added in small amounts to just dissolve the gold. Do not add an excess. Evaporate the solution of gold chloride until it becomes syrupy; or it may be dissolved in water and precipitated with ammonia 26°, to produce a fulminate. The precipitate should then be washed thoroughly several times, each time allowing the precipitate to settle down or filter the solution through filtering paper. The fulminate, when dry, is very explosive so always keep it under water until used, or dissolve it in sodium cyanide solution. You can buy sodium gold cyanide which can be used to the best advantage in preparing gold solutions.—C. H. P. Problem 3,533.

GOLD ON VULCANIZED RUBBER

Q.—Would you please be so kind as to give me an outline of a method and a formula for a solution satisfactory for plating gold on a vulcanized hard rubber base?

A.—To gold plate hard rubber surfaces, it is advisable to coat the rubber with a thin coat of regular rubber cement, then rub in thoroughly a very finely precipitated metallic silver powder, such as is used for preparing silver paints for the basis for depositing silver upon glass.

When the silver coating is dry and hard, gold can be deposited direct. A gold solution for this purpose should contain not less than 1 oz. of sodium cyanide per gallon of water, and an equal amount of sodium gold cyanide and ¼ oz. of sodium bisulphite. If the hard rubber is for dental work, then the above method should be used. If not, then graphite or a mixture of graphite and copper bronze may be used to replace the silver.

The graphite or copper bronze surface when dry and hard should be copper plated in a solution prepared as follows: Water, 1 gallon; copper sulphate, 1¾ lbs.; sulphuric acid, 4 ozs. Anodes, soft sheet copper. After copper plating, gold plate as usual.—C. H. P. Problem 3,534.

PLATING HEADLIGHT REFLECTORS

Q.—What is the best method to use in plating brass auto and brass headlight reflectors? I plate them ten minutes in my nickel, strike, run them twenty minutes in my silver and buff without

scratch brushing. Can I use a mercury strike and is it more sure after coming from the nickel?

A.—The methods used by manufacturers of automobile lamp reflectors made of brass are as follows:

1. Cut down the brass reflector with tripoli, then follow up with a color buff.
2. Cleanse with alkaline cleaners and regular cyanide dip.
3. Strike in the nickel solution just long enough to obtain a uniform bright nickel finish.
4. Wash the reflectors thoroughly, after nickel plating, in cold water, then strike quickly in the following silver strike solution.

Water	1 gallon
Sodium cyanide	96-98% 8 ozs.
Silver cyanide	⅓ oz.
Caustic potash	½ oz.

Use sheet steel or nickel as anodes. Voltage 5 to 6.

The point is to use a high current for about ten to twenty seconds, then remove and plate in the regular silver solution for 5 minutes; remove, wash in cold and hot waters; dry out and color buff. Use a very soft buff, well combed out; the polishing medium to be lamp black and powdered rouge; 2 parts of the former to 1 part of the latter mixed to a paste with kerosene oil. Use just a minute amount on the reflector. It is not necessary to put any on the buff wheel.

Under these methods you can produce results just as good as automobile lamp manufacturers. The secret is to cover the nickel deposit as quickly as possible with silver. Mercury is of no value for this class of product.—C. H. P. Problem 3,535.

POOR NICKEL PLATE

Q.—I have been having trouble with my nickel plating. I use 10 ozs. of nickel salts in a gallon of water; 2 ozs. boric acid; 2 ozs. table salts. I plate for five minutes and then burnish in a barrel. I use burnishing barrel soap and steel balls. The plate blisters and turns black.

A.—You do not mention whether you use single or double nickel salts in the preparation of your nickel solution. In any event, try the following additions to remedy your trouble of peeling of the nickel deposit. Add 4 ozs. Epsom salts and ½ oz. of 75% acetic acid per gallon of solution. If you are unable to secure acetic acid then use muriatic acid, but only ¼ oz. per gallon. If the peeling still continues, add hydrogen peroxide. If your solution is 100 gallons or more, add half pint of the hydrogen peroxide first, then the balance. If the peeling is not overcome in the meantime when you tumble the nickel plated articles, use soap bark ½ to ¾ ozs. per gallon of water. If you cannot get soap bark, try this solution:

Water	1 gallon
Soda ash	2 ozs.
Sodium cyanide	⅓ oz.

Use no soap.—C. H. P. Problem 3,536.

STATUARY BRONZE FINISH

Q.—Could you kindly inform us of the formula used to give copper a statuary bronze finish?

A.—The basis of statuary bronze finishes upon brass or bronze is a copper deposit either from a cyanide copper solution, or an acid copper solution; for formula, see Platers' Wrinkles.

After the copper deposit has been obtained, it should be scratch-brushed down with a soft brass wire scratch-brush, which should be done wet. The brushing water should contain 2 ozs. bicarbonate of soda per gallon of water.

After brushing, the bronze tablet should be immersed in either a solution consisting of water 1 gallon; polysulphide ¼ oz.; temp. 180 deg. F., or water 1 gallon; sulphide of barium 4 ozs.; caustic potash 1 oz.; temperature 180 deg. F.

The tablet should be colored to a dark brownish bronze, then removed; washed in cold and boiling hot waters; and dried in maplewood sawdust. Afterwards scratch-brush dry with a soft brass wire brush to bring out the rich dark red background. The entire tablet should, when the finish has been removed from borders and letters by emery wheel polishing with 180 deg. emery to give the natural bronze, be lacquered or waxed as may be found desirable to protect the finish.

The procedure should be as follows:

After the tablet is ready for finishing, the surface should be either sand blasted or acid dipped to bring up the natural color of the bronze metal.

Polishing should now be applied to the border and letters, 100°, 120° and 180° emery.

Cleanse copper plate and oxidize as outlined. Brush to finish. Polish border and letters. Lacquer or wax to protect finish.

Experiment with small plates first, preferably cast metal plates. —C. H. P. Problem 3,537.

SATIN BLACK NICKEL

Q.—Kindly advise us of the best method of processing steel to be plated satin black nickel finish. Also one or more formulæ for such a black nickel finish.

A.—To produce a satin black nickel finish on steel, the following methods will have to be used.

1. The steel must be free from grease, rust or surface scale. The satin finish should be produced by sand blasting.
2. After sand blasting the surface should be lightly cleansed then nickel plated just long enough to cover the sand blasted surface uniformly.
3. After nickel plating, then wash the articles thoroughly and black nickel plate in the following solution as a low voltage ½ to 1. Volt until a uniform black color results.

Water	1 gallon
Nickel chloride	6 ozs.
Ammonium chloride	6 ozs.
Sodium chloride	2 ozs.
Rochelle salts	1 oz.
Zinc chloride	¾ ozs.
Anodes, cast nickel	95-97%

After black nickel plating and washing and drying out the steel articles they should be lacquered to protect the finish. Other formulæ for black nickel plating can be found in Platers' Wrinkles. —C. H. P. Problem 3,538.

STRIPPING NICKEL

Q.—Can you give us a formulæ or manner for cleaning nickel deposit from steel wire hooks and baskets?

A.—The old method of removing excessive deposits of nickel from hooks, frames and plating baskets was to hammer the nickel until it cracked and flaked off. The new method is to use an electro-strip. The hooks, frames or baskets are made the anode in the strip. The cathode is a sheet of copper that entirely surrounds the inside of the receptacle used for stripping. The results are then just the reverse of plating.

Electro Strip

Sulphuric acid	9 parts by measure
Water	1 part
Glycerin	1 oz. to every gallon of the acid and water.

This method is used very extensively in the Middle West. We presume you make up your plating baskets from wire cloth entirely. Why not make the frame of hardwood 3/8" to ½" thick? Put the wire cloth on the bottom of the wooden frame, then make your hook connections to carry the current to connect with the wire cloth. The hooks could be fastened with the frame with staples, etc.—C. H. P. Problem 3,539.

TUMBLING BRASS

Q.—Please give me some information in regards to tumbling small rough brass castings, so as to get a smooth surface.

A.—Small brass castings can be tumbled to produce a fairly smooth finish in water and sand stone chips, or a good sharp sand. A little soda ash may be added to the water. After tumbling in the sand and water, then re-tumble in a solution consisting of

Water	1 gallon
Soda ash	3 ozs.
Sodium cyanide	⅓ oz.

If a still brighter finish is required, tumble dry in sole leather chips to which is added a little dry lime as the polishing medium. —C. H. P. Problem 3,540.

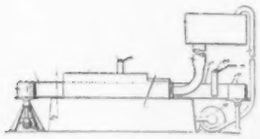
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,579,481. April 6, 1926. **Light Aluminum Alloy and Method of Producing Same.** Victor Evers Hybinette, Monrovia, Calif.

A light aluminum alloy consisting of over 90 per cent aluminum, and the remainder consisting mainly of nickel and metals of the chromium group, in the proportion of about 0.50 per cent to 3.0 per cent nickel and from about 0.25 per cent to 1.50 per cent metals of the chromium group.

1,580,198. April 13, 1926. **Process of Producing Coated or Other Thin Metallic Sheets.** Herbert Champion Harrison, Lockport, N. Y.



The method of producing thin metallic sheets which comprises depositing a layer of ductile metal electrolytically upon a cathode sheet, then subjecting the compound sheet thus formed to a working operation applied progressively, thereby loosening the deposited layer from the cathode sheet, and then stripping the layer from the cathode sheet.

1,580,443. April 13, 1926. **Gold Alloy.** Thomas P. Shields, New York, N. Y., assignor to Shields & Moore, a firm consisting of Thomas P. Shields and G. A. Moore, New York, N. Y.

An alloy containing not substantially below 70 per cent of gold, much smaller but substantially proportions of both iron and of nickel, the two latter amounting to not less than 15 per cent of the alloy, and the iron being over half the amount of nickel, and a still smaller amount of a deoxidizer, such deoxidizer being a solid element which readily forms a solid oxid of the type AO_2, such alloy being of a whitish color, and such alloy being free from other noble metals.

1,580,444. April 13, 1926. **Metallic Alloy.** Thomas P. Shields, New York, N. Y., assignor to Shields & Moore, a firm consisting of Thomas P. Shields and G. A. Moore, New York, N. Y.

An intermediate alloy consisting of 1 to 10 parts of chromium 24 to 50 parts of copper, 10 to 30 parts of zinc, together with some silver but not substantially above 15 parts thereof.

1,580,445. April 13, 1926. **Gold Alloy.** Thomas P. Shields, New York, N. Y., assignor to Shields & Moore, a firm consisting of Thomas P. Shields and G. A. Moore, New York, N. Y.

An intermediate alloy consisting essentially of: chromium 0.1 to 2 parts, copper 24 to 50 parts, and zinc 10 to 18 parts.

1,580,779. April 13, 1926. **Coating Textiles with Metal.** George Crompton, Jr., Worcester, Mass.

The process of coating a textile with an adhering amalgam, which consists in causing a coating of non-mercuric metal to be deposited on said textile, and then bringing the coating in contact with mercury.

1,580,887-1,580,891. April 13, 1926. **Apparatus for Coating and Treating Metallic Materials.** Joseph L. Herman, Peoria, Ill., assignor to Midland Manufacturing Company, Peoria, Ill.

Apparatus comprising in combination means for continuously coating a metallic article and means for continuously heat-treating the coated article so combined that the article passes directly from the coating means to the heat-treating means. Other patents cover the details of various parts of this mechanism.

1,581,188. April 20, 1926. **Process of Eletrodepositing Chromium and of Preparing Baths Therefor.** Colin G. Fink, New York, N. Y., assignor to Chemical Treatment Company, Inc., New York, N. Y.

A method of electrodepositing chromium from solutions of chromic acid, comprising reducing chromic acid at the cathode in the presence of a catalyst and of a protecting hydrogen film.

1,581,269. April 20, 1926. **Process of Treating Metals to Inhibit Excessive Grain Growth.** George L. Kelley, Philadelphia, Pa., assignor to Edward G. Budd Manufacturing Company, Philadelphia, Pa.

The process which consists in preliminary heating cold worked metal to and maintaining the same at a temperature below that required for annealing and then raising the temperature to said annealing point.

1,582,037. April 27, 1926. **Method of Treating Impure Molten Metals.** Henry Harris, London, England.

Process of treating molten metal with a reagent for removal of one or more impurities,which comprises using the reagent in solution form, heating the same to bring the reagent into a physical state suited to the desired reaction and to generate an impelling pressure and intermingling said heated reagent and molten metal utilizing said pressure to effect or assist in effecting said intermingling.

1,582,038. April 27, 1926. **Apparatus for Treating Impure Molten Metals.** Henry Harris, London, England.

In apparatus for the treatment of molten metal, the combination of a heated container for the molten metal, a vaporizing chamber so located in the container as to be immersed in the molten metal so as to be heated thereby, and means for supplying a solution of a reagent to said vaporizing chamber.

1,582,566. April 27, 1926. **Method of Coating Metal and Other Surfaces.** Johann Karl Wirth, Berlin-Charlottenburg, Germany.

A method for producing a strong coating on solid surfaces by means of condensation products of phenol and formaldehyde, and of fibrous materials, comprising, applying a coating layer of the condensation product to the surface to be protected, then applying a layer of fiber to said soating layer, then completely hardening the coating layer, then thoroughly impregnating the said layer of fiber by means of the condensation product after the lowest layer has been completely hardened, and after the impregnation, completely hardening the said impregnating material.

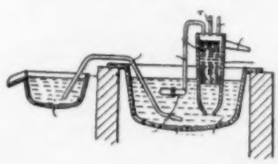
1,,582,567. April 27, 1926. **Electrode.** Victor Yngve, Long Branch, N. J., assignor to Manhattan Electrical Supply Company, Inc., New York, N. Y.

The method of protecting zinc container electrodes for dry cells against local corrosion, which consists in entirely covering the inside surface thereof with a thin film of zinc electrolytically deposited thereon.

1,582,617. April 27, 1926. **Process of Electroplating Metals.** Arnold Mohn, Indianapolis, Ind., assignor of one-fourth to James A. Walsh, Indianapolis, Ind.

The process of electroplating, which consists in employing a metal in powdered or divided form, mixing therewith a metal salt of the metal to be deposited, and applying said mixture under moisture and friction to the metal to be plated, said combination acting as a galvanic cell which creates the electric current for the decomposition and deposition of the metal contained in the salt.

1,583,495. May 4, 1926. **Method of Refining Lead.** Henry M. Schleicher, Monterey, Mexico, assignor to American Metal Company, Ltd., New York, N. Y.



The method of refining lead, which comprises maintaining a bath of molten lead, which is substantially free from the substance removed as impurities, in contact with a reagent capable of absorbing the oxidized impurities and in the presence of an oxidizing agent, and adding lead containing impurities to be removed to the bath at substantially the rate of absorption of the oxidized impurities by the reagent.

RUST PROOF PATENT SUIT

The Parker Rust-Proof Company of Detroit, Mich., is suing the Ford Motor Company for royalties approximating $1,000,000 for alleged infringement of patent in the use of a rust proofing process. During the hearings in his suit, it was brought out that the profits of the Ford company for the last seven years had totalled $526,441,951.

EQUIPMENT

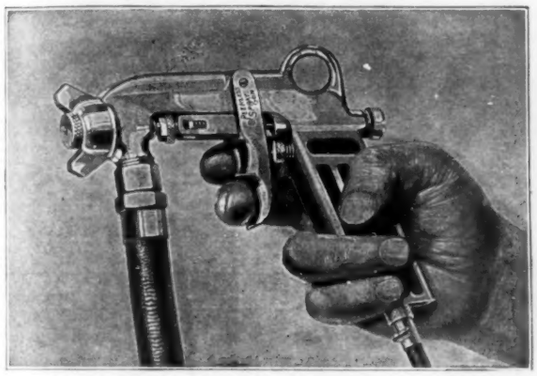
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Finishes and Finishing Equipment

SPRAY EQUIPMENT

The Peerless Pneumatic Systems, Inc., of Chicago, Ill., build a variety of spray equipment for various purposes. This includes spray guns, compressor units, air and varnish heaters, spray booths, pressure paint tanks, portable painting machines, fire protection exhaust systems, and condensation and oil removers.

Specialties of particular interest to metal finishing shops, are their spray guns and the various auxiliary equipment necessary for the use of these guns. Such equipment includes everything from the instruments, regulators, heaters, etc., to a multi-color pressure tank for applying various materials in the spraying process. This tank is made up with four separate compartments, each holding a different color. In this tank a quick change may



PEERLESS SPRAY GUN.

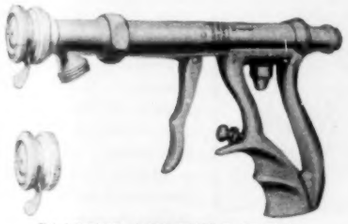
be made from one material to the other without removing the head from the pressure tank, thus saving a great deal of time.

Spray booths and exhaust systems are an important part of the output of this company.

Perfect atomization is the most important quality claimed for the Peerless spray gun. Its concentric nozzle and self-centering atomizing needle breaks up the material. Here air and material are synchronized, it is stated, assuring steady, smooth, even discharge which may be regulated to any required volume of spray, either round or flat. It will regulate also for air spray to dust off the product before applying the finish.

MULTIPLE HEAD AIRBRUSH

The Paasche Airbrush Company of Chicago, Ill., has brought out a new multiple head airbrush with special mechanical features. It is claimed to be the first completely interchangeable, quick detachable combination, round, revolving, floating, and adjustable fan spray airbrush head, made with a range of 5 airbrushes in one. It ranges from a strong jet of clean air pressure, used for dusting off the work before painting to a fine line graduating into a smooth, wide fan spray, 12" to 16" in width. It is claimed that split or uneven sprays do not occur with this brush and that it floats into perfect alignment with the fluid valve plunger, eliminating the leakage of paint.



PAASCHE MULTIFLE HEAD AIRBRUSH.

FINISHER'S GUN

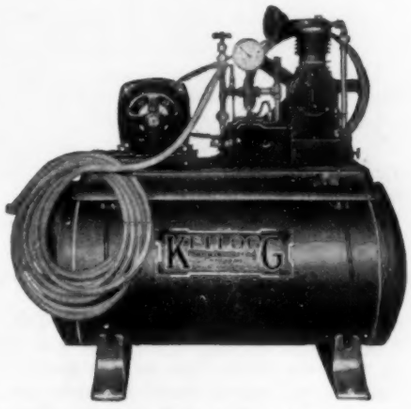
W. N. Mathews Corporation of St. Louis, Mo., has brought out a new finisher's gun with several special features. The weight of the gun has been reduced to a minimum.

The gun has a cleaning plug on the side which, when it is necessary to change the color or clean the gun, can be removed, a solvent poured directly into the side of the gun and blown out in front, carrying with it all the lacquer that may have been lodged in the brush or valve action.

MATHEWS FINISHER'S GUN.

COMPRESSORS

The Kellogg Manufacturing Company, Rochester, N. Y., manufactures a complete line of compressors for use in spray painting and finishing operations. Among these compressors is Model EM 261, single cylinder, recommended for paint spraying surfaces and for use with lacquer and pyroxylin finishes. It contains the dual chrome - vanadium disc valves, patented pump and splash lubrication, air cleaner and muffler, self-cleaning check valve, pressure release valve and condensation chamber. It has a displacement of 8 cubic feet, a pressure of 150 pounds, operates at 400 r. p. m., and weighs about 900 pounds.

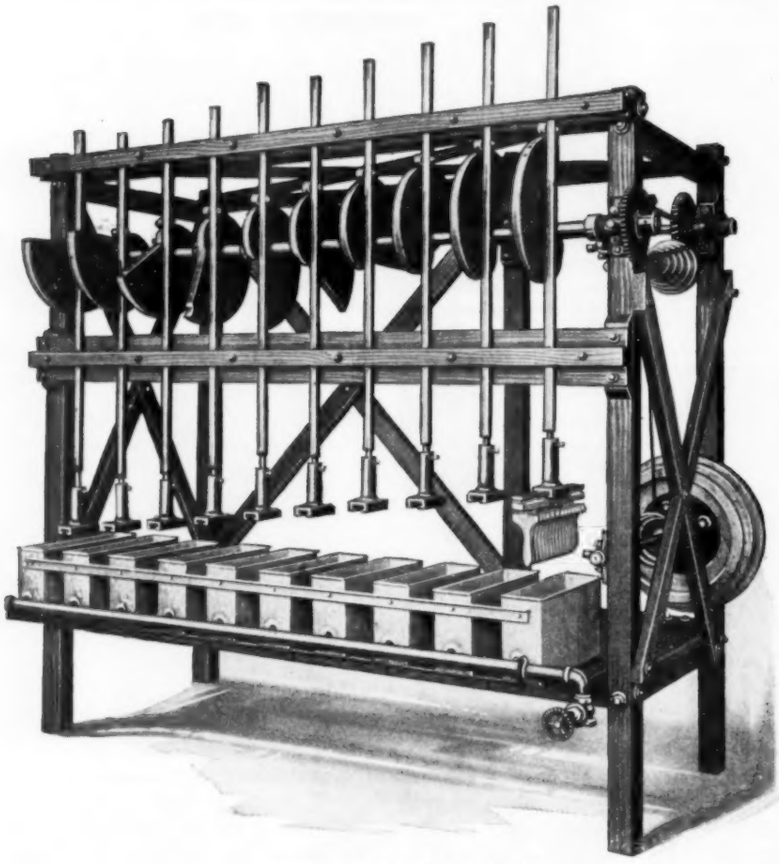


KELLOGG COMPRESSOR

Other types are Model EM 132 and 142, for spray painting, sand blasting, etc. These require 25 to 60 cubic feet of air per minute and pressures up to 100 pounds.

DIPPING MACHINE

C. W. Smith, M. E., of Grand Rapids, Mich., manufactures among other specialties, machines for dipping metal parts to apply lacquers and enamel, etc. The machine operates so that the parts are immersed and then lifted out of the solution at a steady rate



SMITH DIPPING MACHINE

and at capacities of from 25,000 to 100,000 pieces per day. Various kinds of wire and metal goods can be handled and the machines can be equipped to take care of an almost endless variety of objects.

MOTOR CAR FINISHES

The Lasco Shellac and Lacquer Company of Baltimore, Md., markets a system of motor car finishes which is applied in the following fashion: After the old paint has been removed, wash with Lasco lacquer wash, then apply either by spray or brush, one coat of Lasco metal primer, allowing 24 hours to dry. If necessary thin with pure turpentine only.

Rough sand the metal primer, then apply one coat of Lasco sanding surfacer, preferably with a spray. The surfacer should also be thinned with pure turpentine only, and be allowed to dry for at least 8 hours.

The body glaze should be thoroughly sanded and then the second and third coats of Lasco sanding surfacer applied, allowing the necessary drying time between coats.

Special precautions should be taken that the job is thoroughly clean before spraying with lacquer. First apply a mist coat, allowing it to set for at least one hour. Then apply the necessary number of coats as desired, obtaining a high lustre if desired, by rubbing with pumice stone and water, and then polishing with the proper materials, such as Lasco Trimite, etc.

BUTYL PROPIONATE

Buytl propionate is a solvent applicable in the lacquer industry, distributed by Innis, Speiden & Company, New York. A process has been developed for the commercial production of propionate acid for which raw materials are available in commercial quantities and butyl propionate is therefore easily obtainable.

The physical characteristics are as follows. It is colorless; neutral; does not hydrolize in a lacquer; has a relatively high flash point; non-hygroscopic; unaffected by light and air; a direct solvent for pyroxylin and many rosins; its solvent power is not seriously attenuated by the presence of other solvents; it dissolves almost no water and can be manufactured almost anhydrous; its specific gravity is .8669 at 20° C. Its fumes are not dangerous and it does not leave a residual odor.

The presence of butyl butyrate in the material which is available at present, to the extent of about 7 per cent, gives additional slower drying properties, insuring the formation of a smooth, tough, pliable film, free from the orange peel effect. This film can be sanded and polished to a high finish with a minimum of labor, as it has a considerable gloss without polishing and imparts a great depth of tone to the colors. The absence of water and the slow evaporation rate make the lacquer in which it is used resistant to blushing or blooming.

It is predicted that butyl propionate is a solvent which will be used extensively for the manufacture of high grade lacquers.

BAKING OVEN

Skinner Brothers Manufacturing Company, Inc., with offices in St. Louis, Mo., and factories in St. Louis, and Elizabeth, N. J., is building a new revolving door baking oven. This oven is built for operation with gas, electricity, oil or steam for baking temperatures from 600 to 650 degrees F. It can be used for baking operations on japan, enamel, cores, dehydrating, etc.

It is claimed that the elimination of the opening and closing of doors, due to the revolving door feature of this oven, permits the oven to operate at a saving of 30 per cent in fuel consumption over the old-fashioned oven of the same cubic contents. Materials to be baked are placed on or suspended from grids that fit into racks which can be placed at 4-inch height intervals. A half-turn of the door places a charge within the oven and at the same time removes a finished bake. It is said that the oven temperature drops very little compared to that in the oven in which the doors are opened during charging and discharging.

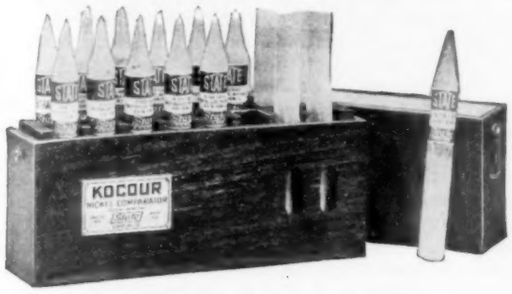
SKINNER BAKING OVEN

Other equipment furnished by this company is as follows: Grid supporting racks; grids of all styles; recording thermometers; automatic control regulators; dip tanks; cleaning tanks; conveying trucks; spray heaters, etc.

NICKEL COMPARATOR SET

The State Manufacturing Company, 4041 South Kedzie Avenue, Chicago, Ill., is placing on the market a new nickel comparator set for analyzing nickel plating solutions.

The nickel comparator set is a colorimetric method of determining the nickel content of any plating or electro-typing solution.



NICKEL COMPARATOR SET

Its accuracy depends solely on the proper neutralization of the green color of nickel solutions. The use of a color screen for this purpose is new and at present they have a patent pending on it. Results obtained with this set are said to have checked with all other methods of determining nickel. The acidity or the presence of other salts than those of nickel do not affect the accuracy of the set.

The standard tubes are non-fading and as there is no reagent to add there is no upkeep to the set; it is a permanent investment. The set is direct reading to the ¼ oz. per gallon and reads between ¼ and 6¾ oz. per gallon. The standards are also calibrated in grams per litre. Readings are in "metallic nickel." Operation of the set is extremely simple, a test can be run in 30 seconds.

The set will be exhibited at the coming convention of the American Electro-Platers' Society.

LACQUERS AND LACQUER ENAMELS

The Royalin Flexible Lacquer Company of Long Island City, has a line of lacquer and lacquer enamels for finishing metal surfaces which includes the following specialties:

Sanding Metal Surfacer. This surfacer dries in about 20 minutes and can be wet or dry sanded to a perfectly smooth surface about an hour after it has been applied. No primer is required and the surfacer should be applied by spray.

Brushing Sanding Surfacer. This surfacer can be applied with a brush. It takes a half hour to dry and can also be dry or wet sanded about an hour after application.

Clear Lacquer. A line of metal lacquers for brass, steel, nickel and silver.

Enamels. A line of lacquer enamels in 16 standard colors exclusive of blacks and whites.

POWER DEMAND LIMITATOR

The Pittsburgh Electric Furnace Corporation, 32nd and Putney Streets, Pittsburgh, Pa., has put out a device called the Power Demand Limitator, the invention of Edward T. Moore, president of that company.

This Power Demand Limitator is an entirely new piece of apparatus for automatically controlling and limiting the "power-demand," "peak-load" or "readiness-to-serve" charges on large power loads, where the charge for peaks drawn on "readiness-to-serve" is such a large fixed part of the total power bill as to make the Power Demand Limitator well worth while.

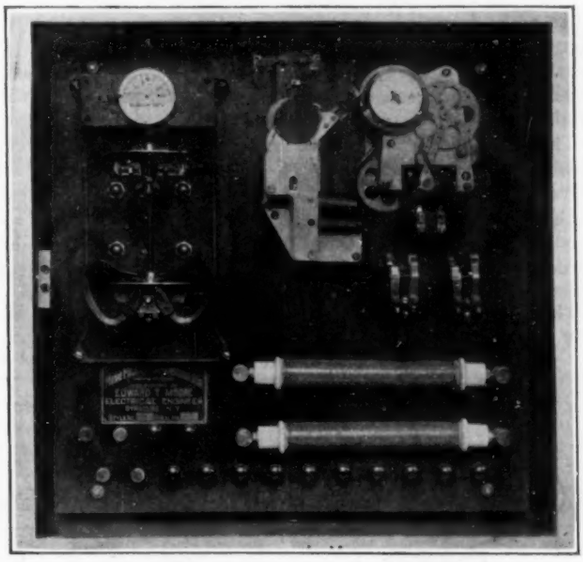
It becomes very expensive for a power consumer to draw a heavy peak for only a few minutes per month and then to continue to pay the "readiness-to-serve" charge, or the demand charge, for the remainder of the month. With the ordinary metering facilities at the consumer's command, it is highly desirable that the consumer should avoid drawing short-time, excessive peaks, but with the ordinary meter installation it is practically out of the question for the consumer to watch and regulate the peak demanded by his load.

This Power Demand Limitator is said to do automatically what both the customer and the central station would like to have done; that is, to limit any unnecessary, unusual, or short-time power peaks demanded.

The senior type of limitator, or Model 1-A Limitator, has a watt-meter element which is connected to the current and potential transformers at the main metering point of the power entrance to the consumer's premises and an electro-magnetic mechanism is embodied in the machine, which is actuated periodically, depending upon the period of the demand, by a set of contacts mounted in a standard totalizing watt-hour meter.

Referring to the illustration, two induction elements mounted on a common shaft will be noted. The torsion on the suspending wire is varied by the rotating dial indicating the secondary watts, so that any load setting may be obtained. When power in the circuit reached the amount indicated by the dial setting, movable and stationary contacts co-act, closing the lock-in relay. A load-adjusting rotating cam, mounted to engage the trip finger of the transfer switch of the integrating mechanism, closes a second relay which opens the relay of the furnace control panel connecting the three-load adjusting resistances to be connected into the circuit of the furnace regulator panel contact-making ammeters, and reducing the power input. The auxiliary clock mechanism operates a demand-period cam, permitting the integrated load over any pre-determined demand period to be secure.

The above description outlines the use of the Limitator with electric steel furnaces but many other applications are feasible. When brass furnaces with automatically regulated electrodes are to be controlled, the Limitator may be connected and used practically the same as with steel furnaces. With hand-operated-control brass furnaces, it is necessary to employ a small motor with gear reduction for manipulating the electrodes. It is applicable to aluminum reduction furnaces and motors for use in rolling mills.



SENIOR MODEL 1A—MASTER CONTROL FOR POWER DEMAND LIMITATOR

1. It will hold down power bills and usually will pay for itself out of earnings in two to three months.
2. It will smooth out the power load and improve the load factor by reducing peaks, and thereby improve the voltage regulation and load factor of the power company's system.
3. It may be used to control and limit the load on individual units as well as the total plant load.
4. It prevents overloads on the system, if so desired.
5. It is simple and reliable and will not give trouble.
6. It is favored (not opposed) by power companies for the reason that their regulation and load factor is improved and excessively high peaks on their system eliminated.

MILBURN OIL BURNER AND PREHEATER

In welding many castings, preheating is necessary to neutralize expansions and contraction strains or to effect economy of gases. Without preheating, complicated castings are likely to develop new breaks at points remote from the weld after the weld itself has been successfully completed. Large castings will absorb a large amount of heat from the welding flame before a local melting heat is attained, so a great gas saving can be made by first preheating the entire piece.

MILBURN PREHEATER

The operations that can be performed economically and advantageously with an oil burner and preheater are very numerous and varied. In foundries, boiler shops, machine and repair shops the uses range from heating soldering irons to burners for core ovens, annealing furnaces, etc.

The Milburn oil burner and preheater made by the Alexander Milburn Company, Baltimore, Md., is primarily designed to give maximum combustion and greatest heat in the quickest possible time, thereby reducing overhead and resulting in greater output from men and machinery. It is of the atomizing type utilizing economically the cheapest grade of crude, fuel, kerosene oil or distillate and compressed air under pressure varying from 50 to 100 pounds.

The air supply line serves two purposes. While furnishing a direct flow to the burner, the air also maintains a similar pressure in the oil storage tank, creating a greater velocity in the oil fuel feed line thus insuring a positive and uniform flow of both oil and air. The flow of both air and oil are through straight-line orifices, unhindered by coils or staggered passages. The oil, under pressure, enters the atomizing chamber at right angles to it and in an annular form, while the compressed air flows directly through the center striking the filament of oil and completely atomizing it, then expanding it in a venturi-shaped outlet. No particles of fuel are blown through the flame unconsumed.

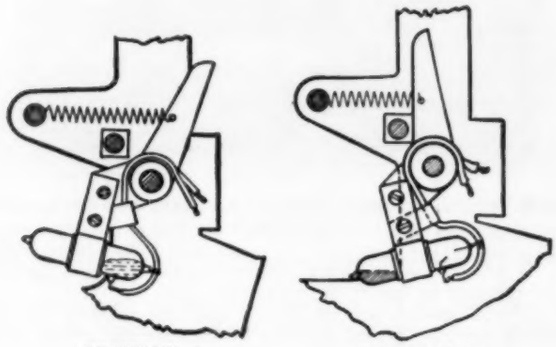
NEW PYROMETER CONTACT SWITCH

To eliminate electrical contact troubles, in connection with pyrometer recorders, the engineers of Charles Engelhard, Inc., 30 Church street, New York City, have developed a novel mercury contact switch. With this switch there can be no loose connections, and dirty contacts and corrosion are impossible.

These accompanying sketches show the switch. It is simply a small glass tube containing mercury, a minute quantity of oil, and an inert gas. Platinum electrodes pass through the glass and are sealed. In position A the mercury makes contact with both of the electrodes, completing the circuit. To break the circuit the tube is tilted slightly to position B causing the mercury to flow away from the terminals to the other end of the tube.

The maximum angle of tilt required to make the mercury flow back and forth is only 15 degrees when operated with extreme slowness. When tilted quickly as in actual practice in the pyrometer recorder the angle is less. The switch is very small, the illustrations being full size. The energy required to do the tilting is therefore so slight as to be almost negligible. The switch is claimed to be absolutely fume proof.

The required number of mercury contacts are all mounted side by side within the recorder case, requiring but little space.



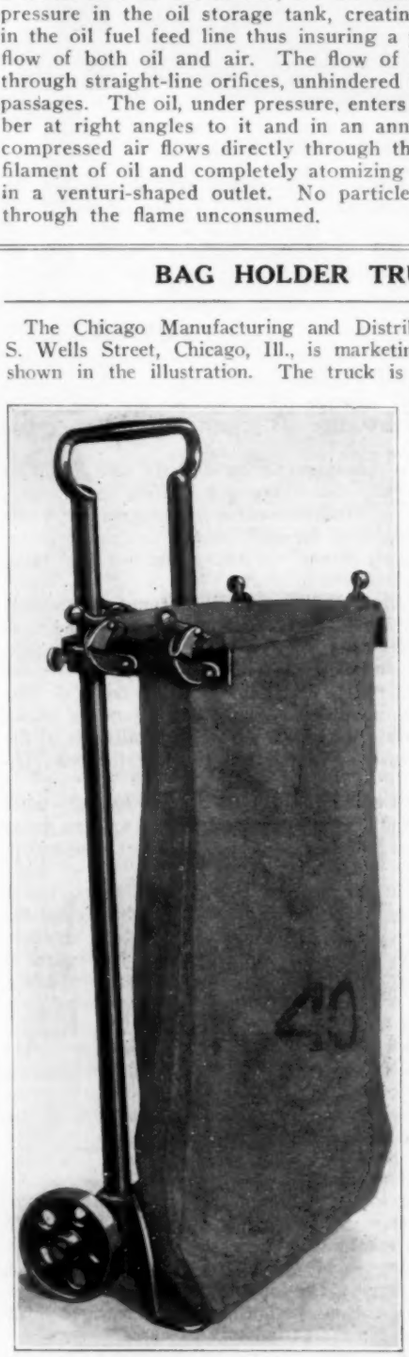
POSITION A POSITION B

For example, where six records are to be made on one chart simultaneously, as is possible with this type of recorder, six mercury contact switches are employed. In other words, a separate mercury switch is used for each circuit.

The resistance is only .003 to .004 ohms, and never varies from these limits.

BAG HOLDER TRUCK

The Chicago Manufacturing and Distributing Company, 4010 S. Wells Street, Chicago, Ill., is marketing a bag holder truck shown in the illustration. The truck is so arranged that the operator can move the bag in the process of filling and can remove any bags or barrels necessary in the course of the work.



BAG HOLDER TRUCK

The dog is so balanced that when the bag is pushed down between the dog and the spreader, the dog automatically grips the bag. The more pull on the bag the tighter it grips. The broad face of the dog and the snubbing action of the bag over the spreader frame prevents tearing of the bag. Loaded bags can be released from the holder by flipping of the dog with the finger, even if the entire weight of the bag is suspended from one dog.

The thumb screws permit it to be quickly adjusted to any height up to 40 inches. It is built on a 9" radius. Outside measurement around arc and across the front is 42 inches. Small bags can be suspended from 3 or 4 clamps. Two bags can be placed on the spreader at once by using the center dog twice. Extra heavy wrought iron pipe is used in standards. High wings on base keep the bag from rubbing wheels and form ample cradle to carry bags or barrels.

NEW ALUMINUM MELTING FLUX

The Apex Smelting Company, Chicago, Ill., announces to the trade that it has been licensed by Dr. Robert J. Anderson, metallurgical engineer as sole manufacturers of his new aluminum melting flux.

This new flux is a combination of salts for the purpose of obtaining a cleansing agent especially for aluminum and its alloys.

The action of the flux is said to be partly mechanical and partly chemical and effects separation of occluded dross and other suspended matter, producing metal generally free from foreign inclusions. The usual hard spots of foundry practice consist of hard foreign particles of about the same density as the aluminum alloy.

The cost of this flux is said to be approximately 1½c for every hundred pounds of aluminum melted.

CORRECTION

In our May issues on page 204, it was stated that the new Schoop spray gun was developed by Werner Schoop. This was in error as the gun is the invention of Dr. M. U. Schoop of Zurich, Switzerland.

In our May issue, on page 205, the address of the Malleable Iron Fittings Company, manufacturers of a new springless vibrator for use in the foundry, was given as Branford, Ohio. This should have been Branford, Connecticut.

EQUIPMENT AND SUPPLY CATALOGS

Oil Engines. Ingersoll-Rand Company, New York.

Pyrometers. Brown Instrument Company, Philadelphia, Pa.

Wire Rope Handbook. American Cable Company, Chicago, Ill.

Inducto-therm Relay. Allen-Bradley Company, Milwaukee, Wis.

Electric Ventilation. American Blower Company, Detroit, Mich.

Electric Motors. Fuerst-Friedman Company, Cleveland, Ohio.

Steam Economy. Republic Flow Meters Company, Chicago, Ill.

Regarding Thread Cutting. National Machinery Company, Tiffin, Ohio.

Period Silver. Benedict Manufacturing Company, East Syracuse, N. Y.

Electric Heating Equipment. General Electric Company, Schenectady, N. Y.

Helicoil Sheath Wire Units. General Electric Company, Schenectady, N. Y.

Tri-Lok Gratings and Treads. The Grating Company of America, Pittsburgh, Pa.

Automatic Rubber Respirator. Hanson and Van Winkle Company, Newark, N. J.

Enamels, Equipment and Supplies. Ferro-Enamel Supply Company, Cleveland, Ohio.

Crushing, Grinding and Screening Equipment, etc. Hardinge Company, York, Pa.

Forging Notes. Forging Machine Talks No. 56. National Machinery Company, Tiffin, Ohio.

Cleaning Compounds. A report on International compound No. 88 and 4B; first sorts potash No. 3; used by A. B. Stove Company, Battle Creek, Mich. International Chemical Company, Philadelphia, Pa.

Tachometers for Recording and Indicating. Catalog No. 1700. Bristol Company, Waterbury, Conn.

Employee Magazines. Policyholders' Service Bureau, Metropolitan Live Insurance Company, New York.

Industrial Capital of Connecticut. Charts showing the importance of Bridgeport, Conn., as an industrial center.

Brass Goods and Plumbing Supplies. New official catalog of the National Association of Brass Manufacturers, Chicago, Ill.

Refractories. Kromepatch-Neutragrog hearths for forge and heating furnaces. E. J. Lavino and Company, Philadelphia, Pa.

Platers, Polishers, Metal Workers and Manufacturing Jewelers' Supplies. New general catalog of Wm. Dixon, Inc., Newark, N. J.

Year Book of the American Bureau of Metal Statistics. Sixth Annual Issue, 1925. American Bureau of Metal Statistics, New York.

Lubricant. A report on International lubricant No. 3 used by the Jacobs Manufacturing Company, Hartford, Conn. International Chemical Company, Philadelphia, Pa.

Brass, Copper and Bronze. General catalog of sheets, tubes, rods, wire, rivets, nails, etc., in stock and ready to ship. U. T. Hungerford Brass and Copper Company, New York.

Brass Cleaner. A report of a test on International compound No. 56 used by Frost Manufacturing Company, Kenosha, Wis. International Chemical Company, Philadelphia, Pa.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 SOUTH DEARBORN STREET, CHICAGO, ILL.

A Pattern Color Chart is being distributed, showing the standard pattern colors adopted by the Joint Committee on Pattern Equipment Standardization. This color chart embodies the standard markings approved by the American Foundrymen's Association and the co-operating societies whose names are noted.

It is the hope of the sponsors and the Joint Committee that the recommended color markings will be followed by all producers and consumers. The charge for single copies will be 10c., five or more copies 5c. each.

The Joint Committee at present is composed of a general group representing the various organizations and is served by three active sub-committees.

These various committees have under consideration questions of recommended practice which will be presented for consideration at the Convention in Detroit. A few of the suggested recommended practices will cover marking gaged surfaces, types of pattern letters, dowel pins for metal patterns and core boxes, dimensions of fillets, the design of pattern plates, and location and dimension of vibrator holes and lugs.

Additional lines of investigation, having for their object the simplification of sizes in flasks and pattern plates, are being considered.

NEW YORK BRANCH, A. E. S.

HEADQUARTERS: CARE OF E. L. TANNERT, 2356 WATERBURY AVE.

The May meetings of the New York Branch, A. E. S. were well attended. One feature of these meetings was an able address by William Voss on the disposition of copper on cellulose and graphite cylinders. Charles F. Beck of Yale & Towne, Stamford, Conn., gave a very interesting talk on welfare work in the brass factory. Royal F. Clark addressed the last meeting on modern methods as compared with old time processes.

The following officers were elected for the coming year:

Franklin McStocker, president. **Arthur Grinham,** vice-president. **John E. Sterling,** secretary-treasurer. **R. J. Liguori,** recording secretary. **R. Quinn,** librarian. **Herman Ruhlman,** sergeant-at-arms. **B. Nadel,** assistant sergeant-at-arms.

TRUSTEES

Adolph Stremel, Joseph Minges, T. A. Gardener.

DELEGATES

William Fisher, Philip Morningstar, John E. Sterling.

ALTERNATES

Chas. F. Beck, Herman Ruhlman, Adolph Stremel.

ELECTROCHEMICAL SOCIETY

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK

At the Annual Meeting, at Chicago, the election of the following officers was announced by the Divisions of the Society:

ELECTRODEPOSITION DIVISION

Chairman: F. R. Pyne, Raritan Copper Works, Perth Amboy, N. J.
Vice-Chairman: F. J. Liscomb, Hanson & Winkle Company, Chicago, Ill.
Secretary-Treasurer: M. R. Thompson, Bureau of Standards, Washington, D. C.
Members-at-Large: Floyd T. Taylor, A. P. Munning Company, Matawan, N. J.
Geo. B. Hogaboom, Hanson & Van Winkle Company, Newark, N. J.
Foreign Representatives: W. E. Hughes, England.
Bertram Wood, South Africa.
A. H. W. Aten, Netherlands.
A. P. Newall, Australia.

ELECTROTHERMIC DIVISION

Chairman: H. M. Williams, Delco Light Company, Dayton, Ohio.
Vice-Chairman: H. W. Gillett, Bureau of Standards, Washington, D. C.
Secretary-Treasurer: L. C. Judson, Acheson Graphite Company, Niagara Falls, N. Y.
Members-at-Large: L. O. Hart, Driver-Harris Company, Harrison, N. J.
W. J. Priestley, Electro Metallurgical Corporation, New York City.

AMERICAN INSTITUTE OF CHEMISTS

HEADQUARTERS, CARE OF L. R. SEIDELL, 60 WASHINGTON STREET, NEW YORK

The American Institute of Chemists exists primarily to serve American chemists and to advance the profession of chemistry in America. It seeks to establish means of insuring competent service in chemistry, and of differentiating between those who are adequately trained for the profession and those who profess to be chemists but who in reality are untrained and incompetent. It is a function of the Institute to say who is a chemist and what constitute the minimum training for the profession of chemistry.

The Institute proposes to establish and maintain for the profession of chemistry a standard of proficiency of such excellence as to insure competent and efficient service.

The Institute will also seek to improve the economic status of the profession of chemistry.

OFFICERS OF THE AMERICAN INSTITUTE OF CHEMISTS

President, Treat B. Johnson.
Vice President, Lloyd Van Doren.
Secretary, L. R. Seidell.
Treasurer, Clarence K. Simon.
Councillors at large; Horace G. Byers, Hugh B. Gordon, Calm M. Hoke, Matthew A. Hunter, James Kendall, Ralph E. Lee, Albert P. Sachs, William Walker.

TESTING MATERIALS SOCIETY

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

The Twenty-ninth Annual Meeting, as has been announced, will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., during the week of June 21, 1926. Monday will be devoted to committee meetings and the first session of the Annual Meeting will be held in the evening, or possibly in the afternoon, of Tuesday, June 22. The closing session will be held on Friday evening, June 25. To accommodate the many items on the program a number of simultaneous sessions will be necessary. At one of the sessions, possibly a special session, the first Marburg Lecture will be given. Sessions on metal will be held on Thursday, June 24.

CHEMICAL EQUIPMENT MANUFACTURERS

HEADQUARTERS, 1328 BROADWAY, NEW YORK

The Exposition of the Association of Chemical Equipment Manufacturers was held in Cleveland, Ohio, May 10-15, 1926. It was supported by a number of Technical societies and a wide variety of industrial firms.

A detailed description of novel apparatus, materials recently developed having new properties for industrial use, etc., etc., and of a wide variety of process equipment and machinery displayed at the Exposition, may be obtained by request from the Association at the above address.

Among the papers read were the following:

"Corrosion Problems in the Heavy Chemical Industry," A. E. Marshall, Consulting Engineer.

"Electro Deposition of Chromium and Chromium Alloys on Brass and Steel," Colin G. Fink, Professor Chemical Engineering, Columbia University.

"Alcumite—An Acid Resisting Bronze," W. M. Corse, Duriron Co.

BRASS INGOT MANUFACTURERS

HEADQUARTERS, CARE OF BENJAMIN HARRIS, 21ST AND LOOMIS STREET, CHICAGO, ILL.

The Brass Ingot Manufacturers' Association has been formed with Benjamin Harris of Chicago, as chairman. Its aim is to promote co-operation between ingot makers in solving the problems of the industry.

LIGHTING EQUIPMENT MANUFACTURERS

HEADQUARTERS, 424 GUARANTEE TITLE BLDG., CLEVELAND, O.

The Annual General Convention of the National Council of Lighting Fixture Manufacturers will be held at Montreal, Canada, on June 23-26, 1926, inclusive.

At this meeting will be presented for the approval of the General Membership, the Four-Year Co-operative Advertising and Merchandising Program and the outline for future activities of the Association, which was approved by the Executive Committee on April 21. This program is based on a Trade Survey of the Industry made by Granville P. Rogers who is now acting as Managing Director of the Association.

New By-Laws and the suggested new name for the National Council, together with a Code of Ethics and Fair Trade Practices is to come up for final approval. The Association is to establish a National Exhibition which will be a permanent yearly affair and created to develop a greater appreciation of the Artistic and Decorative effects of all Lighting Equipment. It is the most constructive, progressive, co-operative program ever undertaken by the Lighting Equipment Industry.

Dealers, Jobbers, Architects, Builders, Incandescent Lamp Manufacturers, Electrical Contractors, Illuminating Glassware Manufacturers, Manufacturers of Lighting Equipment of all kinds and makers of parts and supplies have been invited to join in the movement and attend the convention.

A great many matters of vital interest to the trade will be discussed at this Convention which will establish its headquarters at the Windsor Hotel, Montreal, Canada.

BRITISH INSTITUTE OF METALS

HEADQUARTERS, 36 VICTORIA STREET, WESTMINSTER, LONDON, S.W.1, ENGLAND

ANNUAL AUTUMN MEETING IN BELGIUM

The Annual Autumn Meeting is to be held in Liége from September 1-4, 1926, thanks to the kind invitation of the Association des Ingénieurs Sortis de l'Ecole de Liége.

The meeting will be the first to be held on the Continent since the very successful Ghent Meeting of 1913. It is hoped that it will attract a large number of members both from Great Britain and other countries.

Personals

DR. WILLIAM BLUM

Dr. William Blum of the Bureau of Standards, Washington, D. C., was awarded the first medal of the American Institute of Chemists in June, 1926, for his studies and contributions in the electro-chemical field. He was also recently elected president of the American Electrochemical Society for the year 1926-1927.

Dr. Blum was born in Philadelphia, Pa., December 28, 1881. He graduated from the Central High School of Philadelphia in 1889, and received the degree of Bachelor of Science in chemistry from the University of Pennsylvania in 1903. In 1908 he was awarded the degree of Ph.D. in chemistry.

DR. WILLIAM BLUM

He was appointed instructor and assistant professor of chemistry at the University of Utah from 1903 to 1909. He left the University of Utah to join the Bureau of Standards, Washington, D. C., and is still with that Bureau. At the present time he occupies the post of Chief of the Electrochemistry Section.

During his first five years with the Bureau, Dr. Blum was engaged in analytical researches including the purification of sodium oxalate and the determination of manganese and aluminum. Since 1914 he has been engaged in studies on electrodeposition of metals with special reference to electro-plating and electro-typing. He has published numerous papers on electrodeposition, chiefly in the transactions of the American Electrochemical Society and the American Electro-Platers' Society. He is the joint author of the book Principles of Electro-Plating and Electro-Forming by W. Blum an G. B. Hogaboom. He is a member of the Cosmos Club and the Chemists Club.

Dr. Blum is known throughout the United States for his unremitting efforts to improve the electro-plating industry and to change electro-plating from an art to science. He, largely, is responsible for the adoption by progressive electro-plating plants of solution control by analysis; the "comparator" method of analyzing a solution for hydrogen ion concentration, or judging the pH; the measurement of polarization, and many other advances of importance in electro-plating.

GRAPHITE MINER VISITS AMERICA

A. Gallois of Tamatave, Madagascar arrived in New York May 7th on the SS. "DeGrasse" to visit his American representatives, The Asbury Graphite Mills of Asbury, New Jersey and 50 Church St., New York City.

Mr. Gallois is the largest graphite miner and operator in Madagascar, and while here visited several of the crucible plants to become better acquainted with their requirements. He reports the industry in Madagascar still in its infancy. It will require some time before they will be able to give the world the full benefit of the Madagascar production. Up to the present time the mining and refining has been done by hand, but Mr. Gallois has purchased in America and England modern machinery which will not only reduce the cost, but greatly increase the output. It was his first visit to America and he was very much impressed with the greatness of our country.

Mr. Gallois has lived in Madagascar 27 years. He claims that when once fitted up with modern machinery, Madagascar will take first place on the map of the world in the production of graphite. His visit here was to acquaint himself with our needs, purchase equipment and get better acquainted with the people he deals with. He described in detail the graphite mines and their present method of operation.

GILBERT M. SMITH

The end of the Manhattan Brass Company of New York City brings about the retirement of Gilbert M. Smith, who for the past twenty-two years has been president of that company, and for over forty years has been identified with the brass business. He is well known and respected in brass circles.

GILBERT M. SMITH

Mr. Smith was born at Ballston, Saratoga County, N. Y., and was educated at Clinton, N. Y. He afterwards came to New York City and entered the New York office of the Ansonia Brass & Copper Company, which was then situated at 19-21 Cliff Street. Mr. Smith was with this company for nine years, spending his last three years as manager of their Chicago Branch.

In 1894 he joined the staff of the Manhattan Brass Company as secretary and director and later was elected president. During his industrial life, Mr. Smith has been associated with many men who were prominent in business circles including the late William Earle Dodge who was one of the notable figures in the metal industry at the time Mr. Smith started his career.

The Manhattan Brass Company, as mentioned in recent numbers of THE METAL INDUSTRY, has manufactured brass since 1863, producing plate, sheet, rod, wire, tube and molding, besides brass goods of every description, specializing in cantract work.

The retirement of the Manhattan Brass Company, its president and staff is a regrettable loss to the industry. It is caused by the growth of New York City, and the gradual crowding out of manufacturing plants in the Borough of Manhattan.

R. H. SLITER

R. H. Sliter, one of the well known figures of the American Electro-Platers' Society and an old-time foreman plater has joined the sales force of Maas and Waldstein of New York. Mr. Sliter was formerly with the Zapon Company as their representative in the Middle West. He has been active in the American Electro-Platers' Society since its inception, having been supreme president of that society in 1913. He will make his headquarters with Maas & Waldstein in their Chicago office.

R. H. SLITER

Mr. Sliter's many friends wish him all success in his new post.

Mr. Lee of the J. B. Ford Company, Wyandotte, Mich., is enjoying a two months' vacation in England.

Edmund G. Brown, formerly mill superintendent of the Mazapil Copper Company has been appointed superintendent of the General Abrasive Company.

H. Allen Faust, 915 City Center Building, Philadelphia, Pa., who has been covering the State of Pennsylvania, including the Philadelphia district and Southern New Jersey as salesman of brass pipe and tubular plumbing goods for the Bridgeport Brass Company, Bridgeport, Conn., has had his territory increased by the addition of Maryland, West Virginia and Washington, D. C.

Obituaries

FERDINAND DEMING

Ferdinand Deming died at the age of 81 at the home of his daughter, Mrs. F. D. Smith in Guilford, Conn., on Saturday, May 15, 1926. Mr. Deming was born in Litchfield, Conn., December 5, 1845. He came to Waterbury, Conn., as a young man and entered the employ of the Blake & Johnson Company in 1862 where he spent seven years, graduating as a first-class machinist and tool maker. For many years he was called in to improve the working and adjustment of many of the large factories in Connecticut, among them being Benedict and Burnham, Manville Machine Company, and Brown Brothers Company, now the Randolph-Clowes Company. For the last named he invented and built the first machines for making large seamless copper tube boilers.

FERDINAND DEMING

After the Spanish-American war he spent three years in Spain building the first factory for making cartridge shells in that country. He was engineer for the West Virginia Metals Products Company, Fairmount, W. Va., which he left to go to Birmingham, England, a second time to straighten out a brass mill in that city.

Mr. Deming has probably built or re-built more mills than any one man in the brass industry. His death removes a high grade engineer and brass mill expert and a good friend, whom many will miss. He leaves one daughter, Mrs. F. D. Smith, and one son, James Deming, of Brooklyn, N. Y.

EDMUND NEVILLE TODD

Edmund N. Todd, Chairman of the Board of Directors of The Hanson & Van Winkle Company, whose death was noted in our April issue, died at his home, Old Short Hills Road, Millburn, N. J., on February 4, 1926.

Mr. Todd was one of the original incorporators of The Hanson & Van Winkle Company, serving successively in the positions of Vice-President, President and Chairman of the Board of Directors. Before his connection with The Hanson & Van Winkle Company, he was known as a pioneer and outstanding figure in the nitrocellulose industry. In partnership with Leonard C. Richards he owned the Celluloid Varnish Company in Springfield, N. J., which later developed into the Celluloid Zapon Company. After the sale of the first mentioned company he formed the Newark Chemical Company, which was the licensee under the original celluloid patents for the production of celluloid in sheet form. The Company at that time was a large manufacturer of soluble cotton.

After the death of Joseph Hanson, Mr. Todd purchased his interest in the partnership of Hanson, Van Winkle & Company, and together with his father-in-law, Abraham Van Winkle and Frederick S. Ward incorporated The Hanson & Van Winkle Company, as it is at present known.

Mr. Todd married Anna Van Winkle, daughter of the late Abraham Van Winkle, and is survived by a daughter Gretchen Todd Starck and five sons, Van Winkle Todd, Nelson Todd, Guerin Todd, Rodwell Todd and Edmund N. Todd, Jr.

A. B. SEELIG

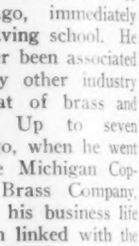
As we go to press word comes of the death of A. B. Seelig of Detroit, on June 2, 1926. Death was due to septic poisoning.

A. B. SEELIG

A. B. Seelig was vice-president and general manager of the Michigan Copper & Brass Company, Detroit, Mich. His experience in the brass business started over 30 years ago, immediately after leaving school. He has never been associated with any other industry than that of brass and copper. Up to seven years ago, when he went with the Michigan Copper & Brass Company, most of his business life had been linked with the development of the Chase Rolling Company of Waterbury, Conn., and later during the war, with the Chase Metal Works, of which, at the time of his resignation, he was an officer and also a director.

HARRY E. STARRETT

Harry E. Starrett died at his residence 3622 East Seventh avenue, Denver, Colo., February 21, 1926, after having retired from a life time of active and devoted service to the electroplating trade. He had been connected with the Hanson and Van Winkle Company of Newark, N. J., for 34 years and had given up the management of that company's Chicago branch late in 1923. He rose from the position of sales representative and was well known to the plating and polishing trade throughout the country, particularly in the Western territory. His cheerful and congenial personality won for him a host of friends both in and out of business circles.



HARRY E. STARRETT

JOHN KENNEDY

John Kennedy, aged 74, for 43 years an employee of the Coe Brass and American Brass plant at Torrington, Conn., died at his home in that city on May 18, after a brief illness, with a complication of diseases. Mr. Kennedy was born in Ireland but came to this country 50 years ago. For many years he was foreman of the annealing department of the Coe Brass plant. He retired from active duty seven years ago. He was president of the Borgeson Manufacturing Company and active in real estate investments in Torrington. In 1910 he was a candidate for burgess of the old borough on the Republican ticket. He was a member of the Knights of Columbus and St. Francis church. A wide circle of friends mourn his passing. He leaves his wife, to whom he was married 49 years ago; three sons, Richard J., Matthew J. and John E. Kennedy; two daughters, Miss Nellie E. Kennedy and Mrs. Agnes K. Green, and four grandchildren. The funeral was held May 20, with burial in Torrington.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

JUNE 1, 1926.

All plants in Waterbury are running, the majority on full time schedules, according to the Industrial Employment bulletin of the Department of Labor in its survey of this city for the month. There was a slight surplus of workers in the manufacturing lines during the month, the bulletin states. Employment in Waterbury is good according to the monthly review of the Federal Reserve bank of Boston and the volume of general business continues substantially above the average.

Copper, brass and bronze to the value of $3,299,369 was exported from Connecticut during 1925, according to figures of the Department of Commerce. Ammunition and fireworks to the amount of $2,088,046 and clocks and watches to the value of $930,311 were exported from the state. The state's total exports exceeded those of 1924 by $4,489,697 and thereby displaced Kentucky for 27th position in the state exporting race.

Charles F. Brooker of Ansonia, chairman of the board of directors of the **American Brass Company,** attended the tenth annual meeting of the National Industrial Conference Board, May 20, in New York.

Local stockholders of the **Anaconda Copper Mining Company,** which owns the American Brass Company, have received notice that the parent company with **W. A. Harriman & Co.,** bankers, have finally acquired control of the Polish zinc mines formerly belonging to **George Von Geische** after negotiations commenced last November. President **Cornelius Kelley** of the Anaconda company is now in Poland conducting the negotiations.

The American Brass Company, through its relationship to the Anaconda company, is now part of the **Copper Export Trading Company.**

The Waterbury Branch of the American Brass Company produced nearly 100,000,000 pounds of manufactured products in 1925, according to the annual statement of the Anaconda company, just issued. The total production for the seven plants of the American Brass Company was 653,268,973 pounds. In their joint report, **John D. Ryan,** chairman, and **Cornelius F. Kelley,** president of Anaconda, say the explanation for the failure of the price of copper to advance correspondingly with the price of other metals and in line with the increase in consumption, is to be found in the intensely competitive effort of the various copper selling agencies, both in the United States and abroad and in the activity of the speculative dealers abroad whose available supplies of copper have been largely increased during the past few years.

An injunction compelling the American Brass Company to remove a fence it is alleged to have erected in a passway to the **Charles B. Schoenmehl Company's** property and damages to the amount of $5,000 are asked in a suit filed in superior court here, last month, by the Schoenmehl company. The claim is made that the property was purchased from the American Brass Company and that the petitioner is entitled to free and unencumbered use of the property.

Augustus S. Chase, son of **Mr.** and **Mrs. Frederick S. Chase,** has been assigned as vice-consul in China. The exact post will be announced later. He is a graduate of Yale and of the diplomatic school at Georgetown and has just completed a course of training in the State Department at Washington. His father is president of the **Chase Companies.**

John **A. Coe,** president of the **American Brass Company,** was re-elected president of the local Y. M. C. A., last week.

E. W. **Goss** of the **Scovill Manufacturing Company,** representative of Gov. John H. Trumbull on the New England Governors' Coal Commission, has returned from a series of meetings of the committee in Boston, Philadelphia and New York, in most cases in conjunction with the Interstate Commerce Commission, with the object of securing cheaper rates and more permanent cheap rates on coal brought into New England from the West Virginia region.—W. R. B.

BRIDGEPORT, CONN.

JUNE 1, 1926.

Sale of the entire assets of the **American Tube & Stamping Company** of this city to the **Stanley Works** of New Britain will be completed shortly, accordinging to an announcement by **Clarence F. Bennett,** president of the New Britain concern. Officials have not divulged the purchase price but the Bridgeport company is capitalized at $3,252,800 of which $1,626,400 is common, the rest being preferred, 7 per cent cumulative. No dividends were reported paid on either preferred or common during 1922, 1923 and 1924, according to Poor's Manual.

Mr. Bennett stated that a meeting of the stockholders of the Bridgeport company has been called for the ratification of the sale. The local company will be operated as a subsidiary of the Stanley Works. The negotiations were conducted between Mr. Bennett and on the one hand, and **Chairman F. Kingsbury Curtis** and **President E. M. Johnson** of the American Tube & Stamping Company. The local company's property consists of 50 acres of valuable land, fronting on the harbor and opposite the railroad station. There are two other plants across the harbor, including an open hearth steel making plant, together with hot rolling mills with capacity for rolling steel for the eastern market; also a large cold rolling plant and a plant for the manufacture of steel stampings. It employs about 1,400 men. Its products include open hearth steel billets, hot and cold rolled steel, nickel plated steel stove edge trimmings, small angles, tees and channels, sheet steel stampings, special drawn and rolled shapes, flat wire. It also does electric welding and brazing, nickel, copper and brass plating, tinning, galvanizing and japanning.

This is the second purchase by the Stanley Works within two months, the other being a concern in Veibert, Germany. **John Cairns,** son of City Engineer, **R. A. Cairns,** of Waterbury, was recently appointed superintendent of the Germany plant.

Harry B. Curtis, treasurer of the **Bridgeport Hardware Manufacturing Company,** has been elected president of the Black Rock Bank, Bridgeport's newest financial institution.

The **Manning, Maxwell & Moore Company** will move over one-half of its New York office force to this city early this month. Only the president, treasurer and controller's staffs remaining in New York. Similar action was recently taken by the **Remington Arms Company.** The mounting cost of living in New York has induced many manufacturers with large office staffs to move as much of their office personnel as possible to their subordinate plants.

All plants in Bridgeport are running full time, some working overtime, according to the Industrial Employment bulletin of the Department of Labor, issued for this month.

A warning to New England to become progressive in its manufacturing arrangements or suffer a loss of prestige that will destroy its industrial supremacy, was delivered in Providence before the American Society of Mechanical Engineers by **E. C. Mayo** of this city, former president of the American Tube & Stamping Company and now presdient and general manager of the **Gorham Manufacturing Company.** He pointed out that New England mechanics have migrated in large numbers and that "the failure to balance this loss of skilled mechanics and patents by introducing the most up-to-date machinery is one of the controlling factors in the present situation." He charged that New England is "the greatest dumping ground for second-hand machinery in the country." This is the result of the state of complacency that is the natural outgrowth of monopolies in skilled labor and patents which they have controlled for generations." he said.—W. R. B.

TORRINGTON, CONN.

JUNE 1, 1926.

The **Fitzgerald Manufacturing Company** has completed plans for the erection of a new building 200 x 300 feet to be used for storage purposes, at its plant at the north end of the city. The building will be one story high of brick and steel construction with a saw-tooth roof.

The **American Brass Company** is enlarging its rod mill at the Torrington branch. The addition will increase the present capacity of the mill by 50 per cent. Plans for this addition have been in preparation for some time. In fact, when the rod mill was built one end was erected only temporarily, it being planned to construct the addition at a later date. The new section will be about 100 feet long of brick, mill construction, with a saw-tooth roof in keeping with the older section. The work of removing two large smoke stacks and the old power house which have not been in use for some time has been completed in preparation for the construction work. The addition will afford more open space, opportunity for more efficient operation, storage space and room for extra machinery which is needed. It is not likely, however, that it will necessitate the taking on of more employes.

The big addition to the plant of the **Hotchkiss Brothers Company** is completed.

Progress is being made on the addition to the plant of the **Progressive Manufacturing Company.**

In addition to the factory building, there is much construction work in progress in Torrington, including many new houses, an addition to the post office, erection of a trade school building and construction of a new schoolhouse at Drakeville.—J. H. T.

NEW BRITAIN, CONN.

JUNE 1, 1926.

While the business of the builders' hardware manufacturing concerns in this city seems to be holding up well, the reported near-saturation point in the automobile industry is being felt by one of the large concerns. The **Fafnir Bearing Company,** through **Vice-president Maurice Stanley,** agrees in this. Mr. Stanley, just back from Detroit, admits that the Ford, Dodge, Studebaker, White, Federal and Cleveland motor companies are reducing their orders for ball bearings for summer delivery. From the present outlook, Mr. Stanley say it will not be necessary for his concern to lay off any of its thousand employes as production will continue to replenish stock on hand, the production of this firm being almost entirely in standard sizes. Mr. Stanley's announcement came immediately after the company had declared an extra 5 per cent dividend based on the first quarterly earnings.

The **Heim Grinder Company** of Danbury has won a patent infringement suit on a process for grinding rolls. While the **Fafnir Company** was the nominal defendant, it loses nothing since the machine in question was bought from the Norton Manufacturing Company of Worcester, Mass., at a cost of about $1,500. The local concern agreed to be sued for adjudication of the patent question.

Another item of no little interest is the purchase by the **Stanley Works** of the **American Tube & Stamping Company** of Bridgeport, Conn. This concern, in addition to its factory plant, owns 50 acres of harbor front, giving the Stanley Works tide water shipping facilities, and numerous buildings for producing cold and hot rolled steel. The capitalization of the purchased concern is $3,200,000 but the purchase price is not announced. The purchase means that the plant at Bridgewater, Mass., operated by the Stanley Works, is to be closed. With the Bridgeport plant added to its already large steel mills in New Britain and also in Niles, Ohio, and Hamilton, Ont., the local concern becomes one of the largest mills of its kind in the east and should be able to produce all the metal needed for its own productions as well as being able to handle orders in the general market.

Rodman W. Chamberlain has been named as sales manager for the **Stanley Works,** succeeding the late **Allan C. McKennie** and **Percival Platt** has succeded Mr. Chamberlain as eastern sales director at the **Stanley Rule and Level Company** of this city.

The new foundry and annealing plant of the **North & Judd Manufacturing Company,** replacing the one which collapsed last winter, is now nearing completion.

The **Landers, Frary & Clark Company** is plugging along on regulation time with good business reported. Several factory additions are being made.

The **P. & F. Corbin,** the **Corbin Cabinet Lock Company, Russell & Erwin** and **Corbin Screw Corporation** divisions of the **American Hardware Corporation** also report business as unusually good and the summer outlook most favorable.—H. R. J.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

JUNE 1, 1926.

There is very little to report with regard to business conditions among the metal-using industries of this city. The situation has undergone little or no change since April, although in some of the larger plants about the city increased activity is noted. Prospects for the coming month are fairly good.

Operations in the various brass foundries about Rochester are close to normal. While the orders received are not extensive, there is a steady demand for finished brass parts that has kept the entire brass-working industry in Rochester well occupied since the first of the year and before. Much of this work comes from the large machinery manufacturing plants about Rochester and vicinity.

Building construction is not so busy as a year ago, which has had an effect on the trade in finished metal products used in inside work.—G. B. E.

NEWARK, N. J.

JUNE 1, 1926.

Vice Chancellor Church has directed the **Furnell Manufacturing Company,** Newark, to show cause why a receiver should not be appointed. The corporation was organized in April, 1925, to manufacture radio parts, and suspended operation some time ago.

The **Standard Motor Rebuilding Company,** of Newark, has been incorporated at Trenton, with $100,000 capital to conduct a machinery and metal plant and rebuild motors.

A cease and desist order has been directed by the Federal Trade Commission to the **Long-Koch Company,** manufacturing jewelers of Newark, in connection with the karat branding of gold mounted pocket knives. Commissioner Humphrey, dissenting, held the Newark jewelers, using the same amount of gold as their competitors, made a better knife and a better looking knife, and "the practice is one to be commended rather than condemned." The concern buys skeleton knives from makers of cutlery, has them mounted and sells them as ten-karat and fourteen-karat knives. The case hinged on the Long-Koch Company's putting a base metal mounting over the skeleton and then on top of that the gold mounting.—C. A. L.

TRENTON, N. J.

JUNE 1, 1926.

Trenton metal industry plants are enjoying a good season and are looking for good business conditions during the summer. An active season in the building lines will be a great asset to the metal lines. Contractors say that much work is anticipated this summer.

The **Ajax Electrothermic Corporation** is erecting a one-story plant, 203 x 60 feet, with two-story office building, 222 x 40 feet at Fernwood, near Trenton. The new plant will house the business of the concern now located in Trenton. The company manufactures electric furnaces and alloys.

Colonel Washington A. Roebling, president of the John A. **Roebling's Sons Company,** Trenton, N. J., recently recovered from a serious illness. Colonel Roebling, who is 89 years old,

has always been an active man. While engaged in building the Brooklyn Bridge he suffered an attack of caisson fever, which left him rather an invalid for many years.

Following concerns were incorporated here: **Household Utilities, Inc.,** manufacture heating appliances, Newark, 2,500 shares.

L. **Schiavons & Bonomo Brothers, Inc.,** Jersey City, $200,000, to manufacture metals.

The **Superior Zinc Corporation,** recently incorporated, will erect a plant at Bristol, Pa., for manufacture of various zinc products. **Herbert J. Maroney,** formerly connected with the Federated **Metals Corporation,** is president of the new corporation. **Charles W. S. Munro,** of Trenton, also formerly affiliated with the Federated Metals Corporation, is the vice-president and plant manager. **Martin M. Pearlman,** of **M. M. Pearlman & Company,** is the secretary and treasurer, while Louis H. **Watmaugh** is assistant secretary and treasurer. In addition to the above officers, who are all directors in the new corporation, **Clarence Wolf,** of **Wolf Brothers & Company,** Philadelphia bankers, is also a director. The new company has a capitalization of $500,000.—C. A. L.

PITTSBURGH, PA.

JUNE 1, 1926.

Business of most manufacturers in this district throughout the first quarter held up well. In a few instances a slackening has recently taken place, but that does not appear to be the general situation. There is, however, some indication of a narrowing of profit margins owing to lower prices as compared with the first quarter of 1925.

Spring orders in the agricultural implement industry have been somewhat delayed by cold weather, but otherwise business in this line has been steady. Various types of machinery are experiencing a normal volume of trade, as inquiries for machinery and machine tools have picked up and orders, while slow in closing, have nevertheless reached a larger volume than in the previous month. Present indications are that the month of May will show a good trade in equipment, although it is admitted that the total will fall below earlier estimates. Seasonable hardware is slightly more active, while builders' hardware continues slow of movement. Building construction has been held back by weather conditions.

Sanitary goods manufacturers are fairly busy.—H. W. R.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

JUNE 1, 1926.

The **Quality Plating and Manufacturing Company** has been incorporated at Indianapolis with a capital stock of $5,000 for the purpose of manufacturing metal devices. The incorporators are Robert C. Piscator, Edward J. Wilson and Annetta T. Wilson.

The sixth anniversary of the **Adams Plating Company,** Indianapolis, is being celebrated with the largest volume of business since the company was organized. The company specializes in plating work for automobiles, particularly radiators, bumpers, headlights and reflecting. A general line of copper, zinc and silver plating also is done.

A permit has been issued to the **Lincoln Brass Foundry,** 911 North Wilbur street, South Bend, Ind., for the removal of the plant to Mishawaka, Ind., in the factory formerly occupied by the Werra Aluminum Company. Leo Hiler and Frederick Korklousz are joint proprietors.

Plans are under way at Winchester, Ind., whereby the **Overmyer Mould Company,** whose plant is said to be the largest of its kind in the world, will secure more ground for the purpose of expanding. The Cook Brothers Foundry Company of the same city also contemplates the addition of extra ground to provide for expansion. Both companies will build additions to their present plants if their plans materialize.—E. B.

DETROIT, MICH.

JUNE 1, 1926.

The **American Enameled Products Company,** it is announced, plans in the near future to move its plants from Chicago to Mt. Pleasant, Mich. It will furnish employment to a considerable number of persons. This company manufactures medicine cabinets, mirrors and other enameled products. It also plans to install much new machinery. A. J. and Edward Smith are the owners.

Funeral services were recently held in Detroit for **William H. Scully,** 55 years old. He was born in Detroit and lived here all his life. At an early age he entered the employ of the **Scott Valve Manufacturing Company** and continued with it practically all his life. At his death he held the position of superintendent.

A complaint has been filed by the **Federated Metals Corporation** attacking the rates assessed on carloads of brass and copper ingots from East Liberty, Pittsburgh, Pa., to Detroit, during the period of January to November, 1925. During 1925 the automobile industry used 245,000,000 pounds of copper. When it is remembered that a vast proportion of all the motor cars manufactured come from Detroit, some conception may be had of the quantities of this metal that are used here. The popularity of the enclosed car, which uses copper and brass for lighting fixtures, is responsible for much of the increased demand for this metal.

The **DeCelles Bronze Company** has been incorporated at Ferndale, Mich., with a capital stock of $50,000. The stockholders are: J. A. Emile DeCelles, 6601 Gratiot avenue, Detroit; Ted M. R. Lupfer, Royal Oak and Raymond N. Larson, Oxford.

A contract to furnish the water board of Detroit with 212 D. W. S. gate valves has been split, it is announced, between the **Michigan Valve & Foundry Company,** Detroit, and **Feil's Brass & Machine Works** of Chicago.

In developing bumper finishes the **C. G. Spring Company** and the **Cecil R. Lambert Company,** both of Detroit, have evolved and patented a new high speed process for nickel plating, and in conjunction with it there has been developed a special conveying system which has cut in half the labor required for handling. With the demand for nickel-plated bumper bars came the need for more adequate protection against rust. As a result the C. G. Spring Company retained the services of **Prof. E. M. Baker,** of the University of Michigan, who has developed a new high speed process of nickel plating. This process reduced the time of plating to approximately one-tenth of the time formerly required, but also provided a rust resistant coating which now has six or seven times the resistance to corrosion offered by ordinary nickel plating. Curtailing the time required for plating introduces economies all along the line. A smaller plating unit, a more rapid turnover and the eliminating of an intermediate buffing operation, made possible by the quality of plate produced, make this process adaptable to many industries. One of the important features in effecting economies in this process is the automatic conveyor system designed and installed by the Cecil R. Lambert Company. Racks on which the bumpers are handled are conveyed from one tank to another by means of a monorail system. Above each tank there is a movable section controlled by an air hoist which lowers and raises the rack of bumpers into and out of the tank. When the process was first developed the work was done by hand. After the conveyor system was applied it was found that the following economies were realized: The number of men was cut in half; better control of production was obtained; the timing of individual operations was improved and speed of production was materially increased.—F. J. H.

CHICAGO, ILL.

JUNE 1, 1926.

Central Truck Company, 3549 Ogden avenue, has been incorporated with a capital of $40,000 to manufacture and deal in motor trucks and parts. The incorporators are: D. A.

Drozeski, E. Roger Burley and J. W. Strong-Reid. Correspondent: D. A. Drozeski, 399 Keystone avenue, River Forest.

Ever Cold Ice Machine Company, 1135 Catalpa avenue, has been incorporated with a capital of $30,000 and 1,000 shares no par value, to manufacture and deal in electric or other ice machines, refrigerators and cooling systems. The incorporators are: Wilmer J. Leidy, Ralph I. Germain and Herbert A. Frankenstein. Correspondent: Fred C. Smith, City Hall Square building.

Gray Water Heater Company, 418 Lake street, Oak Park, has been incorporated with a capital of $50,000 to manufacture and deal in various types of water heaters. The incorporators are: W. C. Gray, Ray E. Fulton and Ralph Helm. Correspondent, W. C. Gray.

The **Commerce Battery Company,** 2732 Indiana avenue, has been incorporated with a capital of $10,000 to manufacture and deal in goods, wares and merchandise of all classes and descriptions. The incorporators are: Fred A. Clawson, Harold C. Lundgren and Charles H. Berlien. Correspondent, C. E. Stemming, Title and Trust building of Chicago. Ill.

The **Gordon Machine Company,** 1638 North Paulina avenue, has been incorporated with a capital of $25,000 to manufacture and deal in electrical appliances. The incorporators are: James Gordon, Frank Winter and Ralph Gordon Schur. Correspondent: Sonnenschein, Berkson, Lautmann & Levinson, 77 West Washington street.

The **Omega Splint Company,** 4943 Sheridan road, has been incorporated with a capital of $20,000 to manufacture and deal in surgical supplies, surgical and medical apparatus. The incorporators are: F. V. Williamson, J. H. Jochsum, Jr., and H. L. Bockfinger. Correspondent, Dr. Gilbert H. Wynekoop, 4955 Sheridan road.

The **Flat Fold Furniture Company,** 160 North LaSalle street, has been incorporated with a capital of $40,000 to manufacture and deal in furniture, metals, products and merchandise. The incorporators are: Albert Kux, George Kux, Herman Kaplan and Fred Kaplan. Correspondent, Rubenstein and Rubenstein, 160 North LaSalle street.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

MAY 15, 1926.

The metal works of Birmingham continued in operation through the first week of the strike, practically without exception, but in response to the wish of the government an effort was made to reduce power consumption by about 50 per cent, and working hours were accordingly from nine o'clock to four. In several trades, there are good orders, the busiest department being the one producing shop fittings and decorative brasswork for display windows. So many large business establishments are rebuilding or extending, that orders in this line are plentiful. For general tubes and sheets, business has been rather small, the threat of the coal stoppage and of the general strike discouraging new business. One of the largest tube manufacturers in Birmingham was informed by a London merchant, quoted for fair orders, that they were obliged to place orders on the continent, as it was impossible to place any reliance on British deliveries.

The production of aluminum is an expanding business, this metal being extensively used in the motor trade, and increasingly for domestic utensils and for engineering. Similarly, nickel is rapidly finding new uses, especially for engineering purposes, and in connection with new metal alloys. The largest Birmingham concern has acquired a new factory which will be in active work shortly after Whitsuntide. Export business is expanding in a very encouraging way, a somewhat unexpected development being a rather large business with the East, India, China and other eastern countries taking rather large quantities of sheet, rod and wire.

The manufacture of electrical appliances has continued fairly active, but this trade also has shared in the restrictive effect of labor unrest. The progress of last year has scarcely been maintained, but demands for lighting and wireless purposes are regarded as decidedly progressive, and it is not considered that the public requirements can be met in less than something like seven years. These trades are assuming the importance of staple Birmingham industries, and foreign buying keeps pace with home demand, very good orders having been received from Australia, New Zealand, South Africa and India. Prices remain practically stationary, being kept steady by keen competition.

BIRMINGHAM SOCIETIES CO-OPERATE

An important step in the direction of co-operative action has lately been decided upon by three important technical societies in the Birmingham area, namely the local branch of the Institute of Metals, the Birmingham Metallurgical Society and the Staffordshire Iron and Steel Institute. The three societies have decided to issue a joint program, although they reserve themselves the right to introduce papers individually for their own members. Birmingham is in a somewhat peculiar position, having several technical societies catering for practically the same technical requirements. Audiences have been unsatisfactory, attributed partly to the multiplication of meetings, a position peculiarly unfortunate, where men of outstanding reputation have been the lecturers or authors. It is hoped that under the new scheme a higher standard of paper will be maintained and that the joint efforts of the three societies will ensure audiences worthy of the occasion.

RESEARCH PROGRESS

The annual meeting of the British Non-Ferrous Metals Research Association was held in Birmingham on April 20th, when there was a large and representative attendance presided over by Thomas Bolton, the chairman, when the council were able to report a doubling of the activities of the association with the aid of a government grant of £8,000 received from the Department of Scientific and Industrial Research. This raised the total expenditures for 1925 to about £15,000, and it is expected that the amount will be increased to £25,000 for the current year. Forty research workers have been engaged, presenting 52 reports during the year. Greater attention is to be given to the investigation of works processes and basic metallurgical problems are to be scientifically studied. Among the matters investigated are annealing furnace practice, die-casting alloys, brass strip ingot casting and lead cable sheathing. There is a strong demand for new researches, and generous gifts have been received towards the promotion of special enquiries of this sort. At the annual meeting a strong appeal was made for the establishment of a special central laboratory for the use of the association, with a view to economized labor and reduced cost of expensive journeys, especially for the director and secretary, Dr. R. S. Hutton. Great practical results are expected to accrue from the association's operations. There is every hope that the government support will be continued, although a hint has been given from the authorities that the association must keep in view the desirability of becoming, eventually, self-supporting.—J. H.

Business Items—Verified

The Chicago office of the **Ohio Brass Company** has been moved from 1217 to 1714 Fisher Building, 343 South Dearborn street.

The **New York Metal Company,** New York, has been organized to deal in all kinds of metals. Its headquarters will be at 489-493 Broome street.

The **Exolon Company,** Thorold, Ont., Canada, manufacturer of abrasives, etc., is asking bids for the erection of an addition, to cost $150,000.

Wilfred S. McKeon, president of Sulphur Products Company, Greensburg, Pa., has received official notification from the U. S. Patent Office that this company's trade-mark has been registered under No. 212,334.

Henry Eggelhof, Box 945, Dallas, Texas, has recently been

appointed exclusive representative for the eastern half of Texas by the Uehling Instrument Company of Paterson, N. J., manufacturers of CO_2 recorders and other power plant instruments.

The general offices and factory of the **Henry Weis Manufacturing Company, Inc.,** were moved in May, 1926, to Elkhart, Indiana. Complete new factory and office buildings were ready for occupancy May 1st.

The **G. K. McMullen Company** has been organized, with headquarters at 201 McMullen Building, 19-27 Division avenue, S. W., Grand Rapids, Mich., for a collective factory branch office sales service.

The **Northern Blower Company,** West 65th street, Cleveland, Ohio, has begun erection of a two-story addition to its plant, 120 x 100 ft., to be used as machine, woodworking and sheet metal departments.

Chamber of Commerce of Bridgeport, Conn., made a visit to the Housatonic avenue plant of the **Bridgeport Brass Company.** This visit was preceded by a luncheon at which W. R. Webster, vice-president, gave a short talk on brass and its importance as an industry.

At the recent annual meeting of the board of directors of the **LaMotte Chemical Products Company,** Baltimore, Md., the following officers were elected: president, W. A. Taylor; vice-president and treasurer, F. W. Burr; secretary and assistant treasurer, Miriam Welch.

The **Power Specialty Company,** 111 Broadway, New York, is now in a position to provide complete steam generating units with the exception of the boiler, and will contract either for a complete steam generating installation or for all of the generating unit with the exception of the boiler. This company has purchased the Aero Pulverizer Company.

The **A. & F. Brown Company** will move its sales department and stockroom to its general office and works at Elizabethport, N. J. Deliveries in New York and Brooklyn will be made by automobile truck as heretofore. Shipments will be delivered at docks in New York City and Brooklyn free of charge, as formerly.

The **Quality Aluminum Casting Company,** 100 Lincoln avenue, Waukesha, Wis., has placed contracts for a shop addition, 80 x 280 ft., which will enlarge the dimensions of the main building to 120 x 400 ft. Inquiry is being made for furnace and crane equipment and other needs. This firm operates an aluminum foundry.

The **General Metal Spinning Company,** 2825 North California avenue, Chicago, Ill., has awarded a general contract to the Mutual Construction Company, for a new one-story plant, 40 x 100 ft., to cost about $85,000 with equipment. B. J. Rappaport, 6709 Lakewood avenue, is architect. This firm operates a spinning department.

Miami Electrotype and Plating Company, 217 Palermo avenue, Coral Gables, Fla., recently organized, has acquired the Miami Plating Works and the Miami Electro-Chemical Company and will consolidate them with its business. Plans are under way for the establishment of a new plating works for nickel, copper, silver and other metals.

Watson-Stillman Company announces that its main office and sales department are now located in the Evening Post Building, 75 West street, New York. The company has also established a branch sales office at 7752 Duboise street, Detroit. Earle M. Porter has been appointed manager. This firm operates the following departments: brass, bronze and aluminum foundry; tool room.

The **Cecil R. Lambert Company, Inc.,** of Detroit, specialists in the design, manufacture and installation of conveying and handling equipment, announces that in order to identlfy its products and service with its name, that the latter has been changed to Mechanical Handling Systems, Inc. The company has added to its plant and personnel, but there is no change in ownership, management or executive staff.

The **Bassick Company,** Warren and Austin streets, Bridgeport, Conn., manufacturer of furniture casters and other hardware products, has awarded a general contract to the Hewlett Company, for its one-story brass foundry addition, 100 x 120 ft., and two-story extension, 20 x 80 ft. This firm operates the following departments: brass foundry, tool room, plating, japanning, stamping, polishing, lacquering.

The **Northern Engineering Works,** Detroit, Mich., have appointed **W. Scott Thomas,** 316 National Exchange Bank Building, Providence, R. I., as a special foundry equipment sales representative in the New England section. Mr. Thomas, who has been connected with the J. W. Paxon Company as manager of its New England business, will handle electric hoists and air hoists, as well as the other material handling products manufactured by the Northern Engineering Works.

Frederic B. Stevens, Ltd., has been established with main office and warehouse in Toronto, Canada, at 139 Royce avenue. This Canadian company will handle and service the entire Stevens' line of foundry facings and supplies, platers' equipment, etc., for the Canadian trade. The firm will also represent the Quigley Company of Canada for the sale and service of Hytempite, acid-proof cement and other Quigley products.

Ground has been broken for an additional factory unit for the **A C Spark Plug Company,** Flint, Mich. The building will be 72 x 252 ft., one story, and of reinforced concrete. When completed the company will have a total floor area of over 12 acres, 4 of which were added in 1925, to take care of its rapidly expanding business. This firm operates the following departments: brass machine shop, tool room, grinding room, plating, japanning, stamping, soldering, polishing, etc.

Kant-Skore Piston Company, Spring Grove avenue and Garrard street, Cincinnati, Ohio, manufacturer of aluminum pistons, has purchased 11 buildings and considerable property on Beekman street from the Lunkenheimer Company. The two largest structures are a four-story concrete factory and a one-story monitor-type foundry. After making improvements the company will move to the new location where it will have approximately 125,000 sq. ft. of floor space. John Eckerle is president. This firm operates the following departments: smelting and refining; aluminum foundry, tool room, grinding room, polishing.

The **Club Aluminum Company,** 1238-1250 Fullerton avenue, Chicago, Ill., manufacturer of cast aluminum kitchen ware, has leased a floor in the Gibbs Industrial Building, East Biddle street, Baltimore, Md., formerly the plant of the Columbia Graphophone Company, for a new branch works. Machinery will be installed to give employment to about 400 operatives, with about 50,000 sq. ft. of floor space given over to manufacturing. William A. Burnette is president; Albert W. Clutter, vice-president, treasurer and general manager. This firm operates the following departments: tool room, grinding room, casting shop, spinning, stamping, polishing.

Industrial and Financial News

NEW INCORPORATIONS

Acme Foundry and Machine Company, Blackwell, Okla., has been organized with capital stock of $40,000 and will do all kinds of general machine shop work; also a jobbing foundry business, making gray iron, brass and aluminum castings. Mark D. Mitchell is president and E. L. Graham secretary and general manager.

The **American Metal-Craft Works and Sales Company,** 9 West 4th street, Cincinnati, Ohio, has been incorporated, with capital stock of $10,000 to manufacture and act as distributor for other manufacturers of such products as bronze and brass plates; steel, bronze and brass grilles, brass railing, iron and wire window guards, folding gates, sidewalk and cellar doors, iron railing, balconies, wire work, iron and wire fence. W. T. Hutcheson is secretary.

The **Brass and Copper Sales Company** has been incorporated under the laws of Missouri, with $25,000 capital stock, of which $16,000 is paid up, to act as sales agent for the **Rome Brass and Copper Company,** Rome, N. Y., at 1712 Chestnut street, St. Louis. H. P. Hubbell is president; J. B. Sharp, vice-president, and H. H. Hubbell, secretary-treasurer, all being members of the firm of Hubbell & Sharp. **G. B. Leitch** has been made manager of the Brass and Copper Sales Company, which will carry a complete stock of the Rome products.

A new lacquer company has just been formed to furnish

the industrial trade with nitro-cellulose lacquers and enamels of all descriptions, as well as special varnishes. The president and general manager of the new company is **Major Ralph R. Adams; B. O. Clausen,** vice-president and sales manager. **O. J. Hartwick,** treasurer and technical director. All of these officers recently resigned from **Edward Smith & Company,** with whom Major Adams held the position of vice-president and general manager; Mr. Clausen field manager and Mr. Hartwick, chief chemist. The new company is known as the **Adams-Clausen Company, Inc.,** with offices and works at Long Island City, New York.

BACTERIA IN ELECTROTYPING SOLUTIONS

During the inspection of electrotyping plants, J. H. Winkler, the research associate of the American Electrotypers Association stationed at the Bureau of Standards, Washington, D. C., observed two interesting cases of excessive growth of molds and bacteria in nickel electrotyping solutions at two local plants. As these formations were causing a great deal of trouble and as the cases appeared to be unique, the advice of the Bureau of Chemistry was obtained on the best method of getting rid of the difficulty. Confirmatory experiments are being conducted in the laboratory, and in the meantime, one of the plants has added thymol to the solutions. Thus far this has proved satisfactory.

BUSINESS TROUBLES

An application of the Second National Bank of New Haven, Conn., associate receiver, of the **Bennett-O'Connell Company,** for additional time for the presentation of claims against the receivership estate, as all the claims have not yet been filed.

A notice has been given by **John A. Scheffer,** receiver of the Metalcraft Corporation that he has filed his first and partial account as receiver and that on Saturday, June 12, 1926, at 10 A. M., in Court Room No. 1, he will apply to the Court of Common Pleas of Lancaster County, Pa., sitting in equity, for the confirmation thereof. Unless exceptions are filed to said account on or before such date, the same will be confirmed; and distribution of the balance may then be made by the court.

MANHATTAN BRASS AUCTION

An auction sale will be held of all the machinery and equipment of the Manhattan Brass Company, New York, now in liquidation. The sale will be held on June 10 and 11, 1926, and will include a complete rolling mill; drawing mill; brass and spinning department; brass casting shop; machine shops; office furniture and fixtures; stock of new finished brass and bronze sheet tubing and rod; brass and iron scrap; dies and tools, etc.

This will definitely end the existence of the last brass mill in New York, which started in 1863 with Jonathan H. Crane at the head. The purchaser of the property, Robert M. Bowler, a real estate operator conducting these operations for a syndicate, will build apartment houses on the site.

METAL ROBBERY

On Saturday, May 22, 1926, the warehouse and office occupied by Hendricks Brothers, Inc., New York, was robbed of 118 pigs of tin. The bandits bound and blindfolded three men, removing the pigs to a truck and escaping before an alarm could be given.

One of the bound and blindfolded men was Mr. Stewart, manager of the plant. The robbers took 53 pigs of Lamb and Flagg tin and 63 pigs of Penang tin. They refused to take any Banka tin, claiming that it was lead. So far, no trace of the robbers has been found.

Mr. Stewart had just received a telephone message that his daughter, who was supposed to have met her grandfather at Pennsylvania Station, could not be found. He was on his way to help in the search when he was confronted by a masked man holding an automatic pistol.

Later word was received that Mr. Stewart's daughter had boarded an earlier train by mistake and had arrived safely at her destination.

The company is insured against theft and since the robbery was carried out by means of firearms, the loss will probably be made up by the insurance as it comes under the head of burglary. In most cases, entrance must be forced through some extraordinary channel to prove the existence of a burglary.

DUPONT CHEMICAL SALES MEETING

What chemical research is doing for the manufacturing activities of the nation through the development of improved industrial finishes for all sorts of products was explained at the business meeting of the Industrial Sales Department of the Chemical Products Division of E. I. duPont de Nemours & Company, held at Atlantic City on April 21 and 22, 1926. The Company invited 125 salesmen and executives from all parts of the country to take part in the program.

The importance of cleaning the surfaces and selecting the proper undercoatings was stressed by Michael C. Callahan, Chemical Superintendent at Parlin, in connection with the application of pyroxylin finishes to metals. He enumerated the following advantages which mixtures with a chemically treated cotton base offer: they dry quickly because of the evaporation of the solvents; they afford in general a very smooth finish due to the undercoats; they are easily repaired if the work is damaged; they can be rubbed in much shorter time than paint and varnish; they can be polished to a high gloss, and they last much longer.

Approximately one-fourth of the program was devoted to Duco, the properties of which distinguish it from all other finishes and from ordinary paint and varnish, and plans were made for its application in new fields. The salesmen showed particular interest in the paper on the accelerated age tests to which all Duco colors are subjected. The duPont engineers have designed a machine to subject these colors in two weeks to the same rigorous tests of sunlight, rain and wear which an automobile would have during two years of service. All Duco colors are thus tested before they are produced in quantity by the Company. A powerful ultra-violet ray applies the sunlight test while alternating sprays of water and dry air subject the color plates to these conditions.

Uniformity is maintained by placing one-half of one per cent as the limit of variation permitted at the duPont chemical products plant.

INTERNATIONAL NICKEL EARNINGS

The International Nickel Company showed a net profit of $1,366,573.43 for the first quarter of 1926. This compares with $1,290,083.73 for the same period of 1925. After dividends on the preferred and common stocks were paid, (at the rate of $6 and $2 per annum, respectively) a balance of $396,192.43 was transferred to surplus.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	...	$ 63	$ 66
American Hardware Corporation	$100	78	80
Anaconda Copper	50	43⅞	44
Bristol Brass	25	6	9
International Nickel, com	25	36½	37
International Nickel, pfd	100	...	102
International Silver, com	100	93	95
International Silver, pfd	100	100	105
National Enameling & Stamping	100	26	27
National Lead Company, com	100	148	150
National Lead Company, pfd	100	117½	118½
New Jersey Zinc	100	185	190
Rome Brass & Copper	100	130	138
Scovill Manufacturing Company	...	225	235
Yale & Towne Mfg. Company, new	...	61⅞	62½

Corrected by J. K. Rice, Jr., Co., 120 Broadway, New York.

ANACONDA EARNINGS

In a year marked by a record production and consumption of non-ferrous metals, the Anaconda Copper Mining Company, its subsidiary and affiliated companies, report a net profit of $17,540,532, after depreciation, bond interest, discount, and other charges. This represents an increase of $10,821,317 over the net for 1924.

The gross income from sales and tolls aggregated $212,770,498 in 1925, as against $166,467,901 the preceding year. Operating profit and income from investment was $33,077,229, as compared with $21,744,965 in 1924. Items in the consolidated income account show sales of metals and manufactured products of $198,698,144; tolls, royalties, rentals, etc., $10,593,875; and sales of merchandise and revenue from public service companies, $3,478.477. Metals and manufactured products on process and on hand aggregated $50,645,457. A further item was noted as of income from investments in sundry companies of $6,522,991.

COPPER STRIKE SETTLED

A strike of 1,100 employes of the Raritan Copper Works, Raritan, N. J., was amicably adjusted on May 16, 1926. Both sides made concessions.

By the agreement, the strikers, who asked for a 10-cent increase over their wage of 45 cents an hour, will accept a 5-cent increase. The hours will not be changed.

The plant management also promises to pay weekly and in cash, instead of by check, and to listen to grievance committees at reasonable intervals.

In their original demands the strikers had asked for an eight-hour day and certain arrangements regarding overtime.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President Whitehead Metal Products Company of New York, Inc.

JUNE 1, 1926.

Reports from mills manufacturing seamless brass and copper tubes and sheet copper indicate that the sale and production of these products is going forward at a rate which has never before been equaled, even during war years. The demand for sheet copper is apparently coming from all directions, but the industries most prominently concerned continue to be the building trade, refrigeration machinery, and washing machines. At the close of May there had not appeared any indication of a slump in any of these industries, and it is therefore felt that the pessimistic conversation which was quite well defined a month or six weeks back cannot be said to apply to this branch of the trade. Many of the largest buildings which are now being erected are completely equipped with brass pipe in their plumbing, the most notable examples recently being the Paramount Pictures Corporation building, Times Square, New York.

In addition to the use of brass pipe for plumbing purposes, there has been a steady movement in the direction of the use of copper and brass pipe as service pipe between street mains and house connections. There are many cities in the East where lead has been abandoned for these connections, and where brass or copper pipe is being used exclusively. It has been indicated that the cost of copper pipe and fittings, although somewhat higher than the best grade of iron, fully compensates for the addition in price by the elimination of removals expense of tearing up pavements; in a few years this additional cost is more than neutralized. In addition to this it has been found that there is no difficulty in maintaining a free supply of water to the premises where such connections are made of brass or copper. There is also a comparison made between the price of copper and brass pipe and lead pipe which is very much in favor of the brass and copper.

The great activity heretofore reported in lines covering nickel and nickel-copper alloys has continued, and the manufacturers of these metals report their tonnages to be greatly in excess of anything heretofore known. The soda fountain and ice cream trade have been responsible for the consumption of huge quantities of this material, and the electric refrigeration industry has also been going forward at a record-breaking pace in the consumption of Monel metal. The producers of Monel metal report that the month of May was the largest in the history of the business in the numbers of orders and total tonnage involved.

It is difficult to observe any feeling of pessimism throughout any branches of the metal industry. While there was a certain degree of nervousness during the past sixty days on the part of some of the producers, this seems to have blown over. Satisfactory business conditions have been maintained.

Metal Market Review

Written for The Metal Industry by R. J. HOUSTON, of D. Houston & Company, Inc., Metal Brokers, New York.

COPPER

JUNE 1, 1926.

Conditions in the copper market have been steady in this country lately. Fluctuations here were comparatively narrow, and the general inquiry was sufficient to keep local prices around 13⅞ cents delivered. There was some shading of this figure, however, from time to time during the past month for more or less important orders, but that is a usual feature when the market is not persistently active.

The foreign situation came into prominence during the past month by reason of the general strike in England and the critical potentialities involved. A sagging London market reflected the foreign attitude. European copper markets were naturally heavy, mainly on free offerings and the unsettled outlook for trade at British centres of industry. Fortunately, the strike was of brief duration, and the altered situation was followed by an improved market tone and increased buying.

There was some shading of price near end of month, with sellers at 13.80@13.82½c delivered Connecticut.

ZINC

The market held its own last month and succeeded in doing even a trifle better than that. There was a fairly good demand, but the buying was not specially active. Producers wisely refrained from forcing sales, and this attitude saved the market from lower levels. The April statistics showed an increase of zinc stocks in smelters' hands amounting to 5,429 tons. A diminution in output would prove a real tonic to the market.

TIN

The tin market was under a decided strain during May. Unsettled conditions were injected into the situation by the British strike, and with shipments of tin suspended from England early in the month buying was animated. Prices ruled at high levels for the first ten days of May, but a reaction set in and the premium on prompts suffered a sharp decline at both London and New York. Straits tin for prompt delivery continued in limited supply and early in the month sold as high as 64⅜c. May delivery sold at 64c. The distant futures were offered at at 59½c for July and 58½c for August. June delivery sold at 61½c, but by the middle of the month the market was irregular and considerably lower.

Trading and deliveries in London were almost at a standstill on account of the strike. The differential between spot and July Straits tin was 4⅞c on May 11, but before the month was out the spread between these positions was reduced to 1⅜c. Demand for prompt Straits was almost nil at end of month. The July and August positions were in request and sold at 59¼c. Interest centered around what May statistics would show. The market closed firm.

LEAD

A downward tendency developed in the lead market in May and prices receded from 7.85c New York at beginning of the month to 7.65c at close. Lower prices attracted a fair amount of buying in the domestic market at eastern and middle west localities. The price reduction was followed by signs of steadiness in both the foreign and local markets. Heavy English stocks have been a depressing factor in the London market and speculators have taken advantage of the situation by taking a bearish attitude. Consumption continues in good volume, and the present level of values should result in stimulating new buying demand on an active scale. Statistics of world lead output by about 78 per cent of reporting sources show a total production of pig lead in April of 110,902 tons, as compared with 111,932 tons in March and 103,441 tons in February. There was a substantial amount of buying to cover nearby requirements on basis of 7.50c at St. Louis. June shipment was also in fair demand and market was steady at month end. Present price is 3.15c below the high level last year. Lead should begin to look more attractive.

ALUMINUM

Consumption appears to continue in large volume. Sales also indicate operating schedules are giving the market good support. Some manufacturers report record breaking activity. Producers are therefore in a comfortable position and able to maintain the market at 28c for 99 per cent plus Virgin ingot aluminum and at 27c for 98-99 per cent material. The use of aluminum appears to be decreasing in the automotive industry. Requirements in other lines, however, have apparently increased. Spot stocks are said to be light and little resale metal offering.

ANTIMONY

A radical change has come over the market for antimony in recent weeks. Realizing sales hastened the downward tendency early in May. Consuming demand was not large enough to bring about much of a rally after prices settled to 9.50c duty paid for prompt delivery, with futures at same price or possibly a shade below. China accepted the new market basis for shipments and followed the New York decline closely enough to effect moderate sales.

Demand has improved and more market stability is noted. Sales of Chinese regulars were made at 7½c c. i. f. New York, for June-July shipment. Closing prices were firmer at 9¼@ 9¾c duty paid.

QUICKSILVER

Demand does not appear to be very active at present. Prices for the article are considered high at $91.50 to $92 per flask. Foreign position is regarded as strong.

SILVER

The course of silver has been fairly steady lately. China and India were recent buyers. Price recovered to 65 cents, but demand will have to come in stronger to send the bullion price higher.

PLATINUM

Refined platinum quotes $104 to $105 per ounce. Consumption in United States showed an increase last year, the bulk of supplies being used for jewelry.

OLD METALS

Consumers of old metals appear to be getting along on a hand-to-mouth basis at present. Market conditions are rather quiet and the undertone easy. A fair movement is reported in heavy copper and wire, but export inquiry for brass grades were not quite liberal enough lately to meet views here. Heavy lead has been in demand at 6.50c, but price weakened later to 6.25c, with battery material at 4.50c. Aluminum scrap showed an easier tone for old castings and sheets. New York prices are 11½@11¾c for crucible copper, 9¼@9½c for light copper, 7@7¼c for heavy brass, 9@9¼c for new brass clippings, 6@6¼c for heavy lead, and 4c for old zinc.

WATERBURY AVERAGE

Lake Copper—Average for 1925, 14.427—January, 1926, 14.25c.—February, 14¾c.—March, 14.25c.—April, 14.125c.—May, 14.00.

Brass Mill Zinc—Average for 1925, 8.263—January, 1926, 9.00c.—February, 8.20c.—March, 7.80c.—April, 7.45c.—May, 7.20.

Daily Metal Prices for the Month of May, 1926

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	3	4	5	6	7	10	11	12	13	14	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Electrolytic	13.80	13.80	13.80	13.80	13.80	13.80	13.80	13.80	13.80	13.80	13.80	13.80
Casting	13.50	13.50	13.50	13.50	13.50	13.40	13.40	13.45	13.45	13.45	13.45	13.45
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.80	6.75	6.75	6.80	6.85	6.80	6.75	6.75	6.75	6.85	6.90	6.90
Brass Special	6.90	6.85	6.85	6.90	6.95	6.90	6.85	6.85	6.85	6.95	7.00	7.00
Tin (f. o. b., N. Y.) c/lb. Duty Free												
Straits	62.50	63.25	64.375	64.50	64.00	64.00	64.50	64.00	62.50	63.00	62.50	61.75
Pig 99%	60.00	61.00	62.50	62.75	62.50	62.00	62.50	61.25	60.75	61.00	60.50	59.75
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	7.70	7.70	7.70	7.70	7.65	7.65	7.60	7.55	7.55	7.55	7.60	7.60
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	13.00	12.75	12.75	12.75	12.25	12.875	12.50	12.50	12.50	12.50	12.25	12.25
Silver c/oz. Troy Duty Free	64.625	65.375	66.125	64.875	64.75	65.75	65.375	65.375	65.00	65.25	65.00	65.00
Platinum $/oz. Troy Duty Free	106	106	106	106	106	106	106	106	106	106	106	106

	19	20	21	24	25	26	27	28	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free											
Lake (Delivered)	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Electrolytic	13.75	13.75	13.75	13.75	13.70	13.70	13.70	13.70	13.80	13.70	13.77
Casting	13.40	13.40	13.40	13.40	13.40	13.35	13.35	13.35	13.50	13.35	13.43
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.											
Prime Western	6.875	6.85	6.85	6.85	6.85	6.85	6.875	6.95	6.95	6.75	6.83
Brass Special	6.975	6.95	6.95	6.95	6.95	6.925	6.925	7.00	7.00	6.85	6.924
Tin (f. o. b., N. Y.) c/lb. Duty Free											
Straits	61.50	61.00	61.00	60.50	61.00	61.00	60.75	61.125	64.50	60.50	62.438
Pig 99%	59.50	59.00	58.50	58.25	58.75	58.50	58.25	58.50	62.75	58.25	60.288
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	7.60	7.60	7.50	7.50	7.50	7.50	7.50	7.50	7.70	7.50	7.588
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.											
Ingot	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	11.50	11.00	10.50	10.00	10.00	9.50	9.50	9.75	13.00	9.50	11.631
Silver c/oz. Troy Duty Free	65.00	65.00	64.875	64.875	64.75	64.75	65.00	65.00	66.125	64.625	65.088
Platinum $/oz. Troy Duty Free	106	106	106	106	106	106	105	105	106	105	105.9

Metal Prices, June 7, 1926

NEW METALS

Copper: Lake, 14.00. Electrolytic, 13.70. Casting, 13.30.
Zinc: Prime Western, 7.00. Brass Special, 7.10.
Tin: Straits, 58.875. Pig, 99%, 56.75.
Lead: 7.55. **Aluminum,** 28.00. **Antimony,** 10.75.
Nickel: Ingot, 35. Shot, 36. Elec., 39. Pellets, 40.
Quicksilver, flask, 75 lbs., $91.50. **Bismuth,** $2.70 to $2.75.
Cadmium, 60. **Cobalt,** 97%, $2.60. **Eilver,** oz., Troy, 65.125.
Gold, oz., Troy, $20.67. **Platinum,** oz., Troy, $105.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10¼ to 11
Brass Ingots, Red	11¼ to 12¾
Bronze Ingots	11¾ to 12¾
Casting Aluminum Alloys	21 to 24
Manganese Bronze Castings	23 to 41
Manganese Bronze Ingots	13 to 17
Manganese Bronze Forging	34 to 42
Manganese Copper, 30%	28 to 45
Monel Metal Shot	32
Monel Metal Blocks	32
Parsons Manganese Bronze Ingots	18¼ to 19¾
Phosphor Bronze	24 to 30
Phosphor Copper, guaranteed 15%	18⅞ to 22½
Phosphor Copper, guaranteed 10%	18 to 21½
Phosphor Tin, guaranteed 5%	70 to 80
Phosphor Tin, no guarantee	65 to 75
Silicon Copper, 10% ....according to quantity...	28 to 35

OLD METALS

Buying Prices		Selling Prices
11½ to 11¾	Heavy Cut Copper	13 to 13½
11¼ to 11½	Copper Wire	12¾ to 13
9¾ to 10	Light Copper	10¾ to 11¼
9 to 9¼	Heavy Machine Composition	10½ to 10¾
7¾ to 8	Heavy Brass	9 to 9¼
6¾ to 7	Light Brass	8 to 8¼
7¾ to 8¼	No. 1 Yellow Brass Turnings	9½ to 10
8¾ to 9¼	No. 1 Composition Turnings	10½ to 11
7¼ to 7½	Heavy Lead	8 to 8¼
5 to 5¼	Zinc Scrap	6 to 6½
12 to 13	Scrap Aluminum Turnings	15 to 17
19 to 20	Scrap Aluminum, cast alloyed	21 to 22
22½ to 23	Scrap Aluminum, sheet (new)	24 to 25½
38 to 40	No. 1 Pewter	42 to 44
12	Old Nickel Anodes	14
18	Old Nickel	20

Wrought Metals and Alloys

COPPER SHEET

Mill shipments (hot rolled) ..... 21½c. to 22½c. net base
From stock ..... 22½c. to 23½c. net base

BARE COPPER WIRE

16¼c. to 16⅜c. net base, in carload lots.

COPPER SEAMLESS TUBING

24¼c. to 25¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order ..... 21 c. net base
100 lbs. to 200 lbs. in one order ..... 21½c. net base

ZINC SHEET

Duty, sheet, 15% Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount ..... 11.25 net base
Casks, jobbers' price ..... 12.50 net base
Open Cacks, jobbers' price ..... 13.00 to 13.25 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price ..... 40c.
Aluminum coils, 24 ga., base price ..... 36.70c.
Foreign ..... 40c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	58c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	50c.	Hot Rolled Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c or over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver, 65½ to 67½c.

BRASS MATERIAL—MILL SHIPMENTS

In effect March 26, 1926
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18⅞	$0.20¾	$0.22¾
Wire	.19⅜	.20⅞	.22⅞
Rod	.16⅝	.21⅛	.23⅛
Brazed tubing	.26⅞	.....	.32⅛
Open seam tubing	.26⅞	.....	.32⅛
Angles and channels	.29⅞	.....	.35⅛

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

23½c. to 24½c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod ..... 20⅞c. net base
Muntz or Yellow Metal Sheathing (14"x48") 18⅞c. net base
Muntz or Yellow Rectangular sheet other Sheathing ..... 19⅞c. net base
Muntz or Yellow Metal Rod ..... 16⅞c. net base
Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal			Wire and Rod		
10%	Quality	26¾c.	10%	Quality	29¾c.
15%	"	28¼c.	15%	"	33½c.
18%	"	29½c.	18%	"	36¼c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base)	35	Hot Rolled Sheets (base)	42
Cold Drawn Rods (base)	43	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, June 7, 1926

ANODES

Copper: Cast	21½c. per lb.	**Nickel:** 90-92%	45c. per lb.
Rolled	21⅛c. per lb.	95-97%	47c. per lb.
Electrolytic	18⅝c. per lb.	99% plus	49c. per lb.
Brass: Cast	20½c. per lb.	**Silver:** Rolled silver anodes .999 fine are quoted from 68c. to 70c. per Troy ounce, depending upon quantity purchased.	
Rolled	21⅛c. per lb.		
Zinc: Cast	13⅝c. per lb.		

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$33.05–33.10
14" 20 ply 64/68 Unbleached	41.15–42.55
12" 20 ply 80/92 Unbleached	33.65
14" 20 ply 80/92 Unbleached	45.60
12" 20 ply 84/92 Unbleached	39.55–42.85
14" 20 ply 84/92 Unbleached	53.60–57.60
12" 20 ply 80/84 Unbleached	37.75–38.90
14" 20 ply 80/84 Unbleached	51.20–52.40

Sewed Pieced Buffs, per lb., bleached .70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—Butyl	lb.	.18–.22½
Denatured in bbls	gal.	.40
Alum—Lump Barrels	lb.	.03¼
Powdered, Barrels	lb.	.042
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech, bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.30
Copper— Acetate (Verdegris)	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls	lb.	.05
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate (Copperas), bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12⅛
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—Carbonate dry, bbls	lb.	.29
Chloride, bbls.	lb.	.19
Salts, single 300 lb. bbls	lb.	.10½
Salts, double 425 lb. bbls	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.09¼
Potassium Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.66
Nitrate, 100 ounce lots	oz.	.45¼
Soda Ash, 58%, bbls	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs	lb.	.20
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.43
Tripoli, Powdered	lb.	.03
Wax—Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, casks	lb.	.07⅜
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03⅜